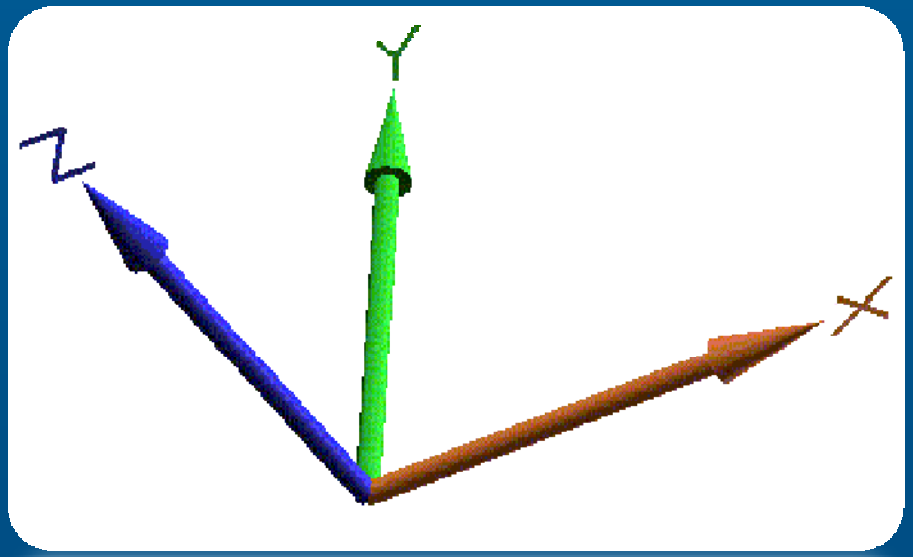
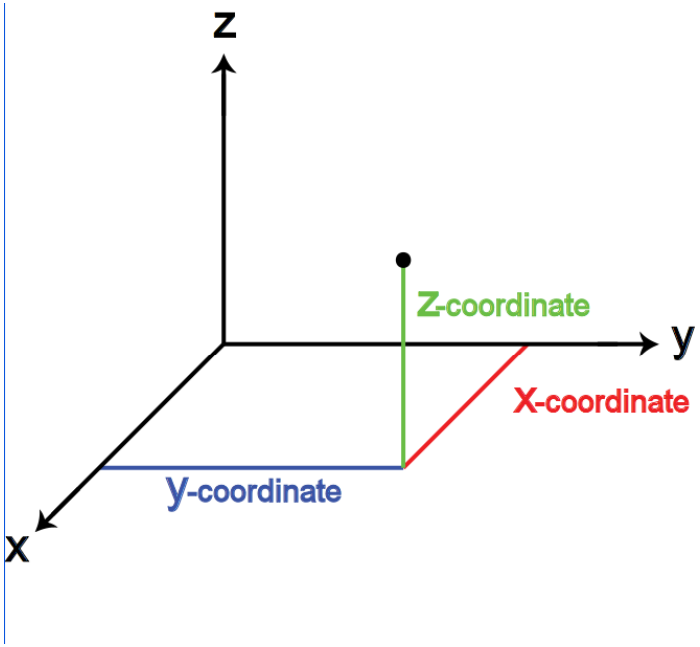
SRP PRO WORKSHOP

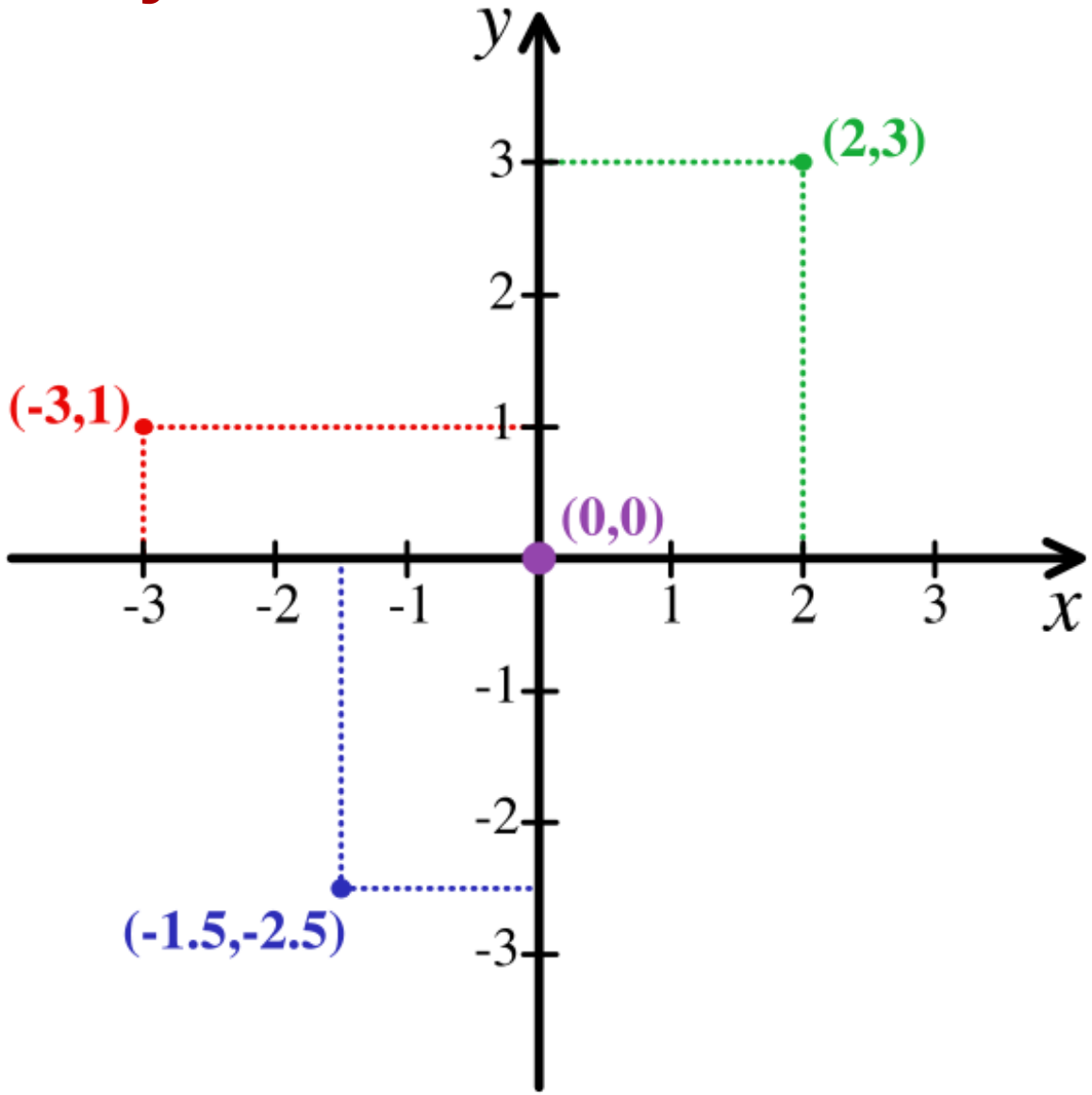
NOVEMBER 2008



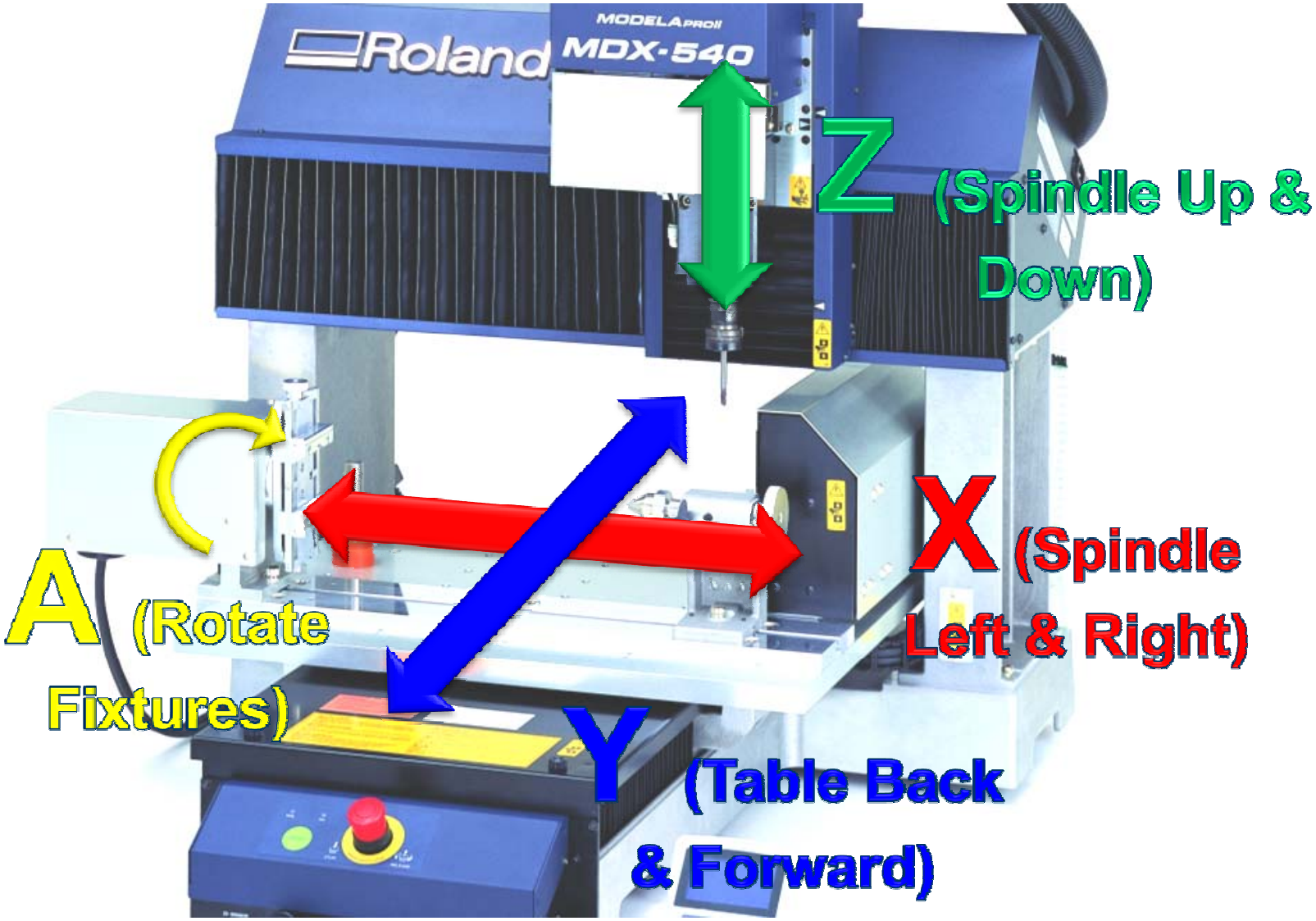
Axis Movements

Coordinate System Basics



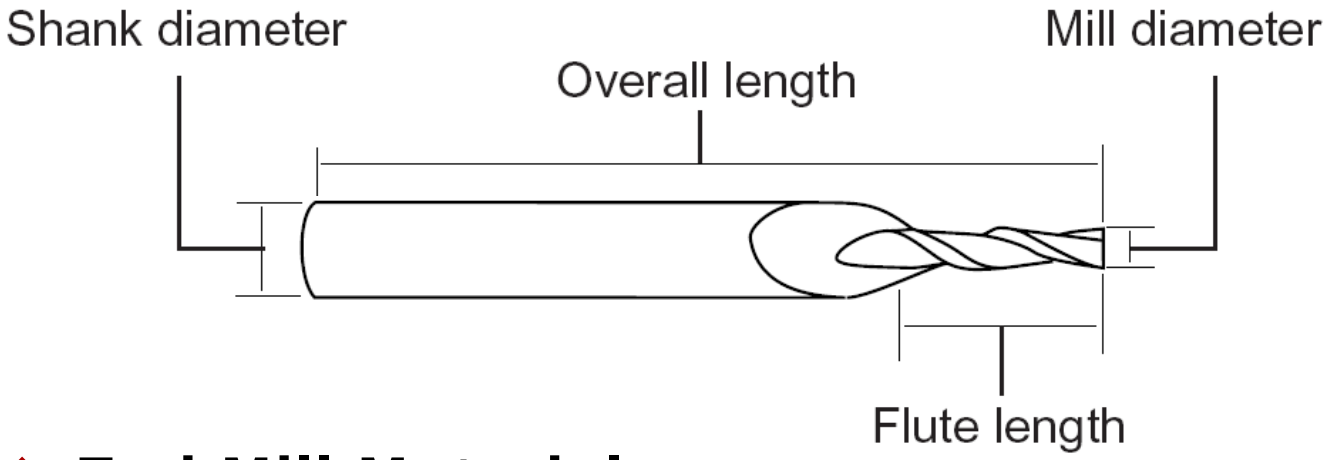


MDX-540


Roland
MODELA PRO II
MDX-540
Z (Spindle Up & Down)
X (Spindle Left & Right)
A (Rotate Fixtures)
Y (Table Back & Forward)

End Mill Knowledge

End Mill Knowledge



NOTES:

End Mill Materials

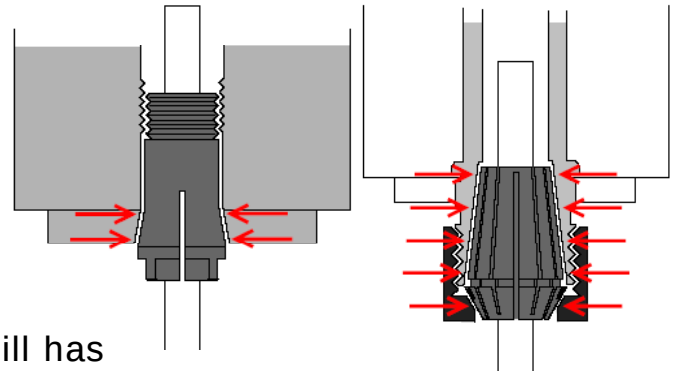
- **High Speed Steel or HSS**
  - Provides decent wear resistance and costs less than carbide end mills
  - Material is ductile and less prone to chipping

- **Carbide or Cemented Carbide**
  - Provides excellent wear resistance and hardness
  - Material offers better rigidity than HSS which enables the end mill to provide a higher degree of dimensional accuracy and superior surface finish
  - Can be run 2 – 3 times faster than HSS and are best for maximizing speed and tool life
  - Brittle material and can be chipped if dropped

End Mill Knowledge

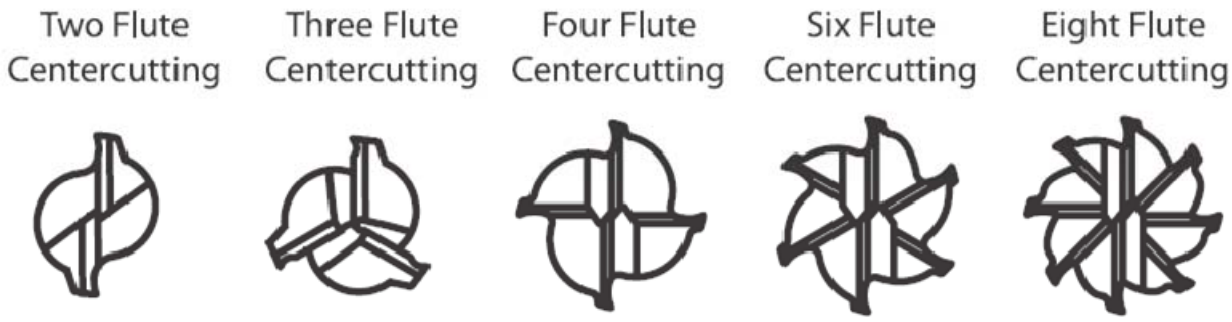
Shank & Collet

- Shank is portion that is held by machine and used in conjunction with collet type holder
- Comes in standard sizes
  - 1/4”, 1/8” for standard sizes
  - 6mm or 3mm for metric sizes



Flute

- Number of cutting blades an end mill has
- Two flute end mills have greatest amount of flute space for more chip carrying capacity
- Three flute end mills have same flute space as two flute, but has a larger cross sectional area and thus provides greater strength
- Four or more flutes are ideal for finishing work only due to smaller flute space



NOTES:

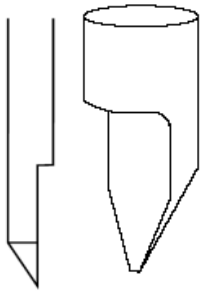
End Mill Knowledge

End Mill Type

- **Flat or square end mill**
  - Used for cutting flat or stepped items
  - Prone to fail due to very small and brittle corners

- **Ball end mill**
  - Used for cutting curved surfaces and wavy shapes
  - Most common used
  - Usually stronger than flat end mills

- **Engraving tool**
  - Used for engraving text on name plates and rating plates

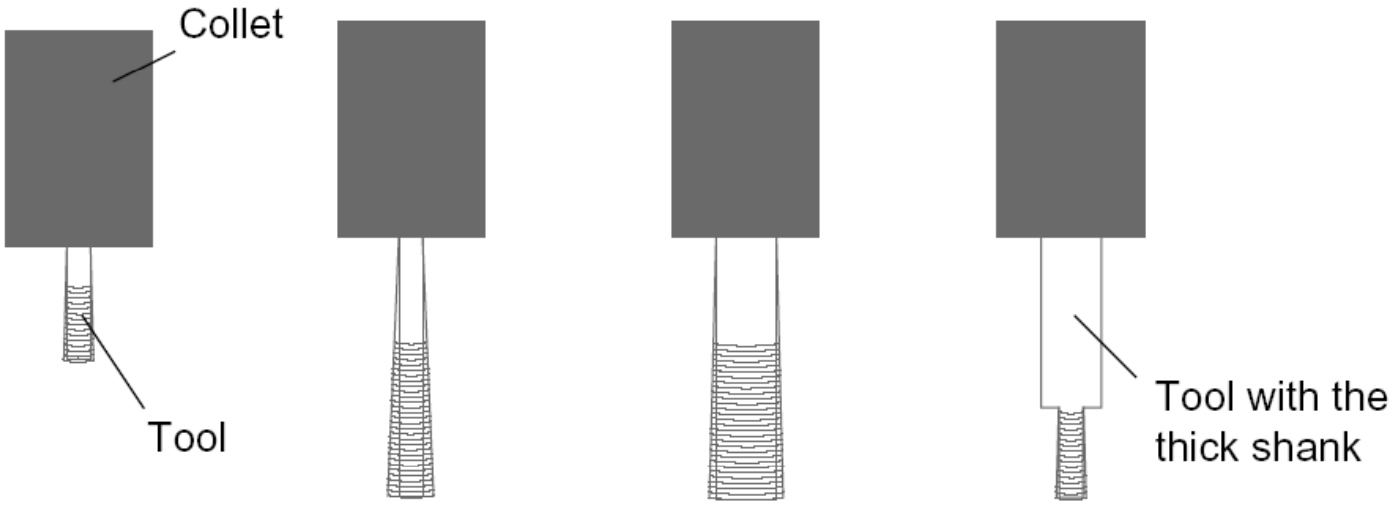


NOTES:

End Mill Knowledge

End Mill Selection Tips

- Select shortest possible end mill for greatest rigidity
- Select multiple flutes for greater rigidity and better finishing
- Use largest diameter possible for added strength and rigidity

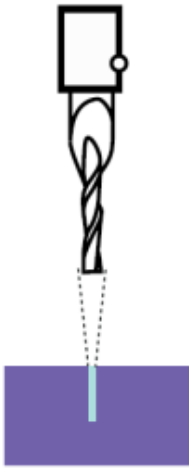


NOTES:

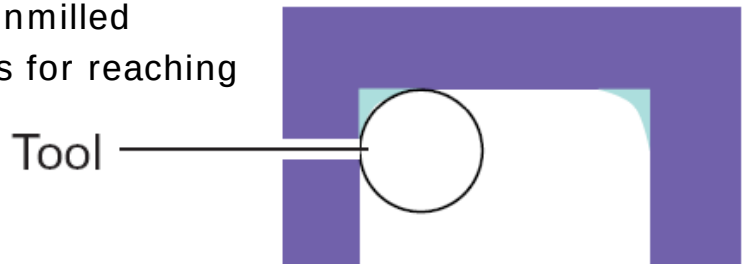
End Mill Knowledge

End Mill Limitations

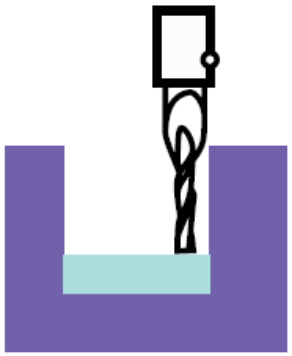
- Can't mill hole or feature smaller than tool diameter



- A large mill will leave corners unmilled
  - Use smaller diameter tools for reaching corners



- Can't mill a wall taller than length of tools reach.
  - Need longer fluted tool or long reach tool



NOTES:

End Mill Knowledge

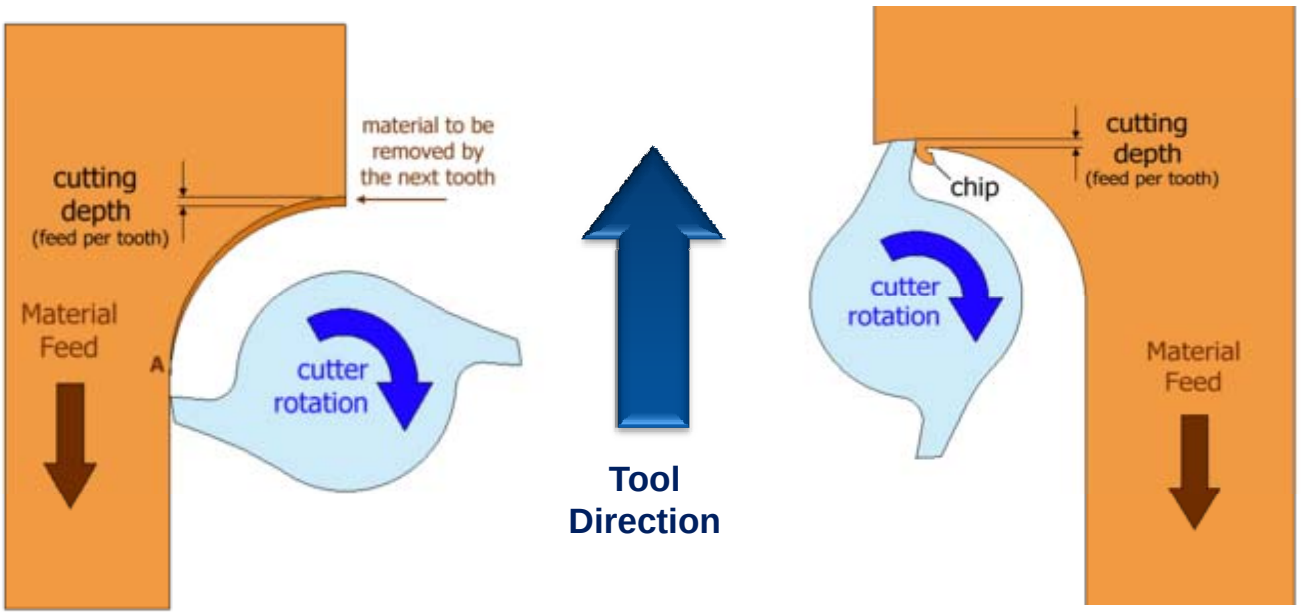
❖ Climb vs. Conventional Milling

•Conventional Milling

- •Also known as "**Up**" milling
- •Cutter gradually removes chip until it breaks off
- •Usually leaves a poor finish on material

•Climb Milling

- •Also known as "**Down**" milling
- •Easier chip removal
- •Better surface finish
- •Longer tool life



NOTES:

End Mill Knowledge

Common Milling Problems & Solutions

- **Excessive Chatter**
  - Problem:
    - Vibration and sound are excessive when the tool engages the workpiece
  - Possible Solutions:
    - Reduce cutting forces by reducing speed or depth of cut
    - Increase system rigidity by changing to a shorter end mill or improving your work piece fixturing

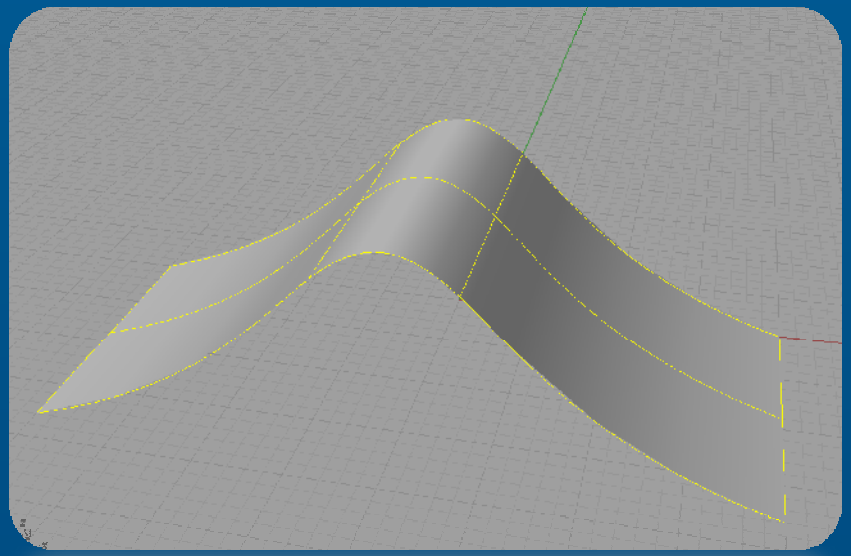
- **Poor Surface Finish**
  - Problem:
    - Work Surface looks uneven and feels rough
  - Possible Solutions:
    - Increase system rigidity
    - Increase speed
    - Reduce depth of cut
    - Reduce cutting forces
    - Change to an end mill with more flutes

NOTES:

End Mill Knowledge

- **Excessive Wear on End Mill**
  - Problem :
    - Tools is wearing at cutting edges causing poor performance
  - Possible Solutions:
    - Reduce speed – 50% reduction in speed will almost double tool life
    - Increase/Decrease feed – Feed rate that is too light will cause excess rubbing
    - Change geometry of tooling – number of flutes, length of cut
    - Change material and or add a coating

NOTES:

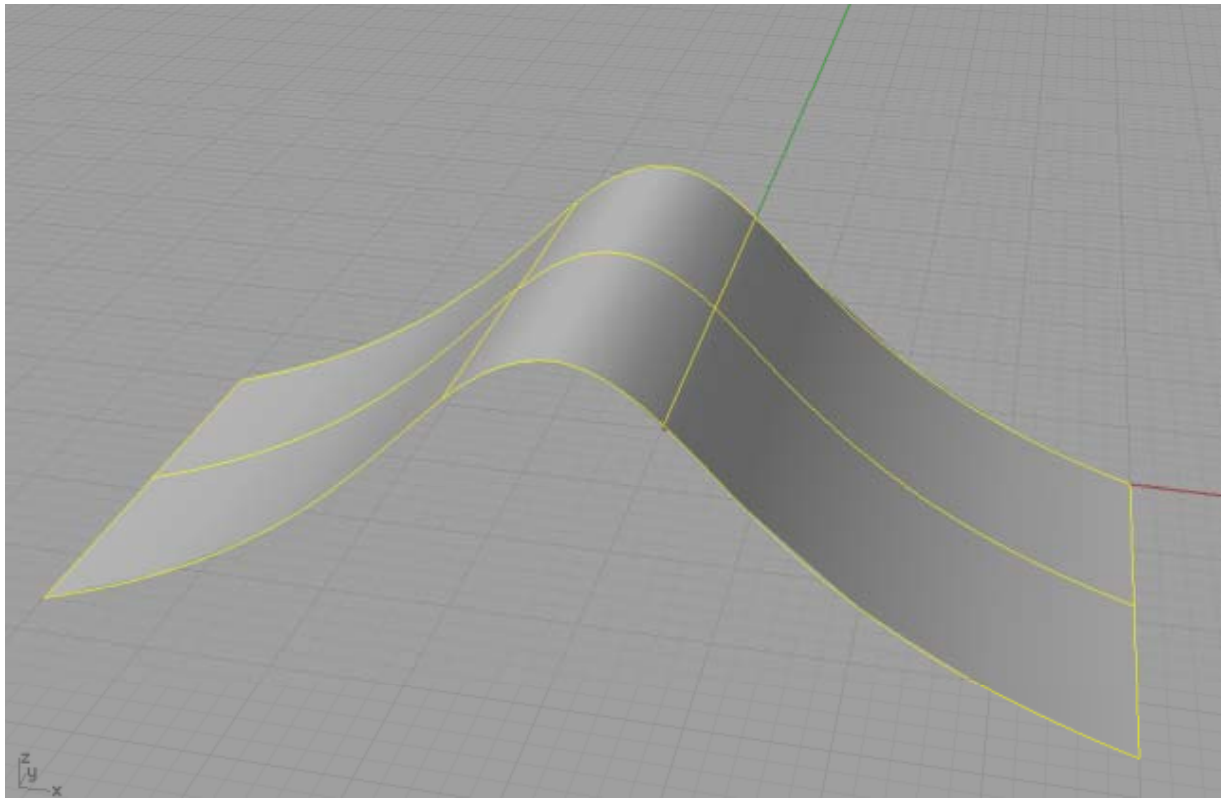


File Formats Knowledge

File Format Knowledge

NURBS vs. Polygons (Mesh)

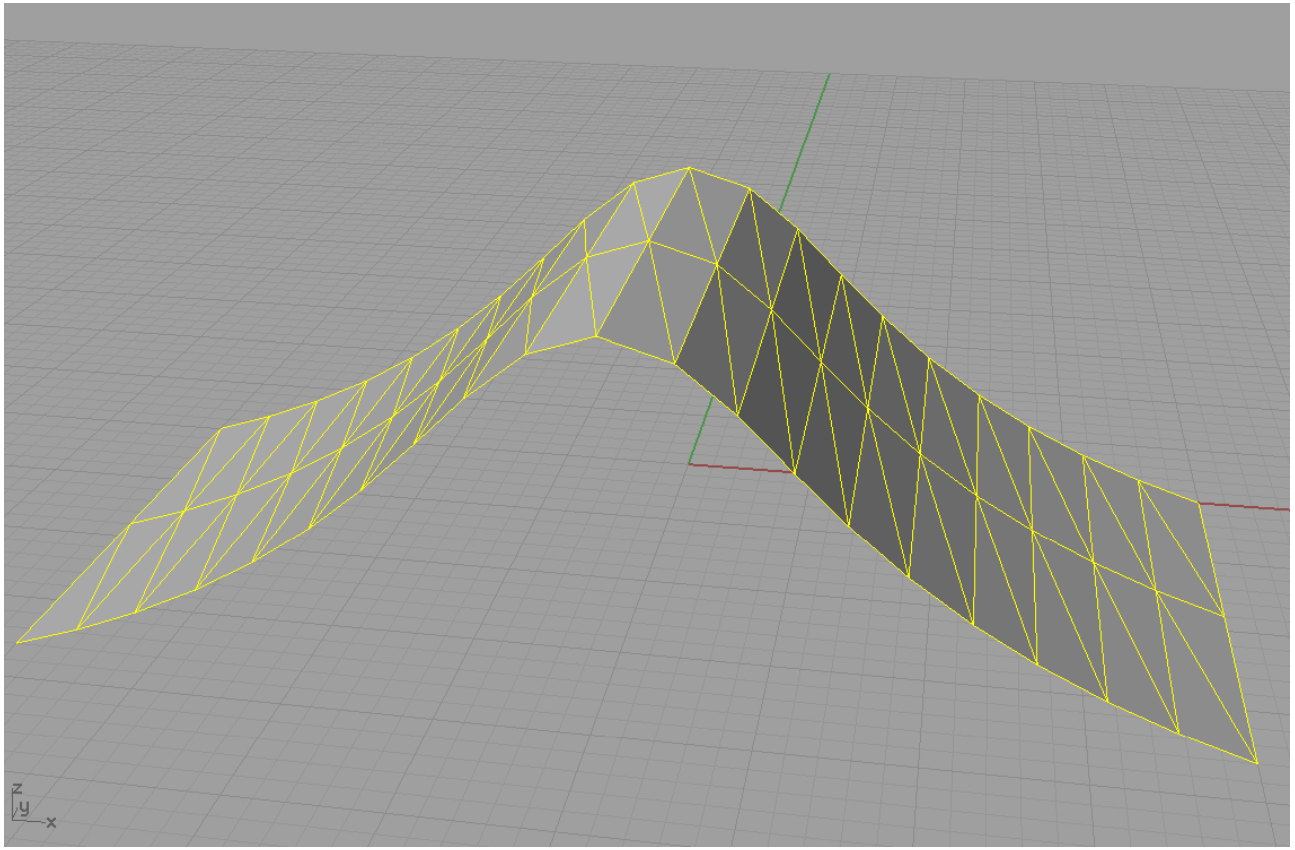
- **NURBS**
  - Non-Uniform Rational B-Splines. Nurbs curves are two dimensional curves whose shapes are determined by a series of control points. When a series of curves are joined together, they form a three dimensional Nurbs surface.
  - More commonly used to model organic curved surface objects.



NOTES:

File Format Knowledge

- **Polygon**
  - A geometry element formed by connecting three or more points. A triangle or three point polygon is the simplest form of polygon geometry. It is a quick way of modeling three dimensional objects but does not easily generate smooth curved surfaces

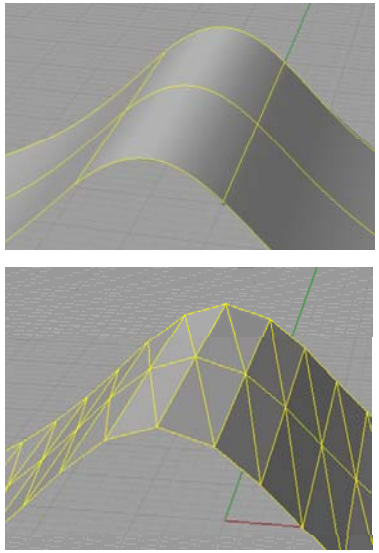


NOTES:

File Format Knowledge

Common Examples

- **NURBS**
  - IGS
  - 3DM
- **Mesh**
  - STL
  - DXF



What Format Does Roland Software Need?

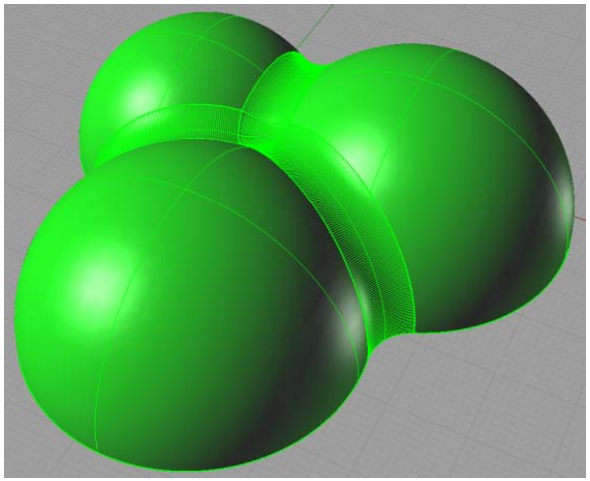
- Roland software packages require STL files to create cutting tool paths. IGS files will also work, however STL files are the most common.
- All CAD or design software will export to STL type files

NOTES:

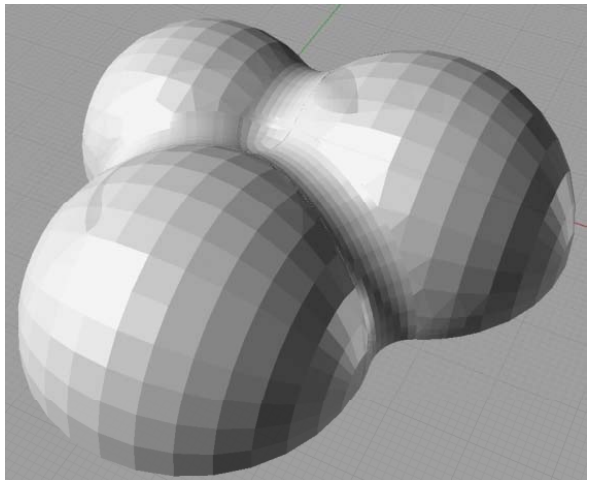
File Format Knowledge

How Much Detail Should be Exported?

- When creating an STL file, you can select the level of detail desired.
- Below are a few examples of different STL details.



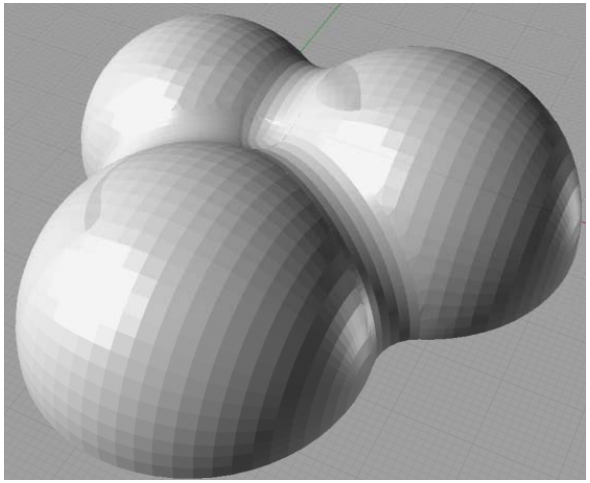
Original Surface File



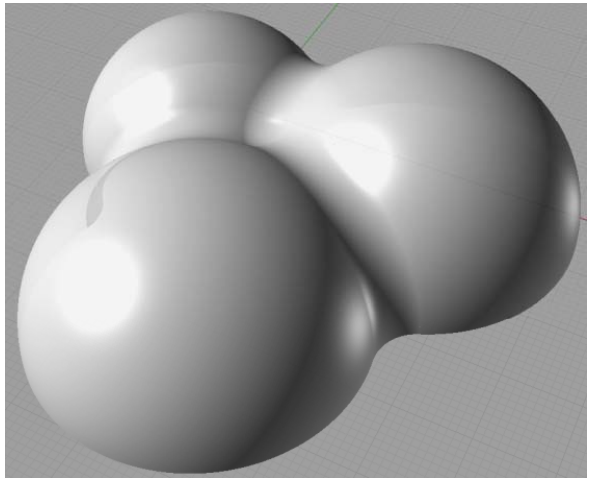
Large Mesh

NOTES:

File Format Knowledge



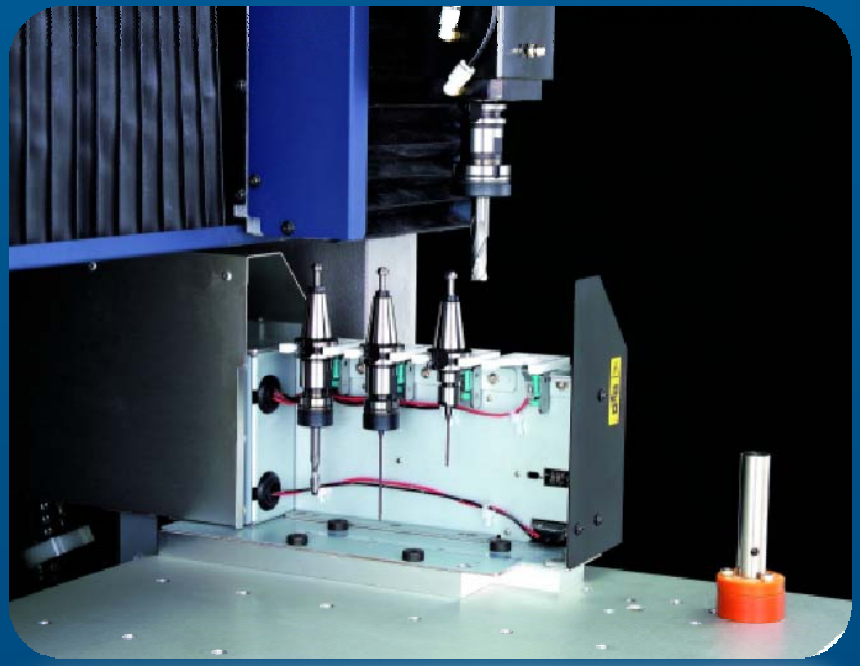
Medium Mesh



Small Mesh

- The smaller the mesh, the larger the file will be and the longer it will take to cut.
- You want to use a mesh size that is suitable for your parts and needs.

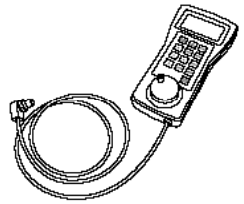
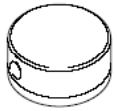
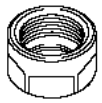
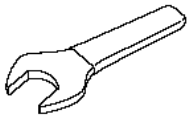
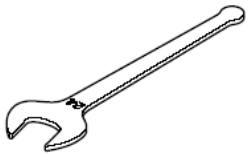
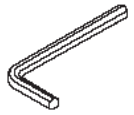
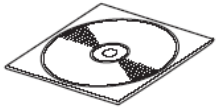
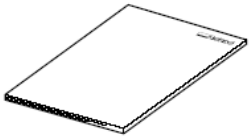
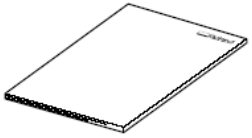
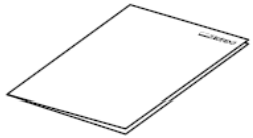
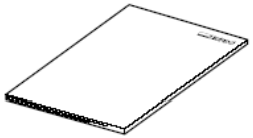
NOTES:



MDX-540 Setup

What's Included

- All items included with MDX-540

 Handy panel	 Power cord	 Tool sensor	 Sensor cable
 Nut (*)	 Nut wrench (*)	 Wrench (24 mm) (*)	 Hexagonal wrench (4 mm)
 Roland Software Package CD-ROM	 SRP Player CD-ROM	 User's Manual (this manual)	 Roland Software Package Software Guide
 SRP Player Installation and Setup Guide	 NC Code Reference Manual		

NOTES:

•Please be familiar with the names of all the accessories listed here.

MDX-540 Driver Install

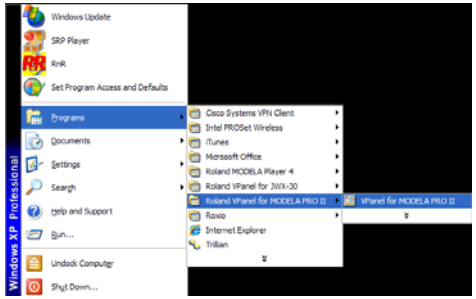
- **Driver Install**
  - Turn on machine
  - Turn on computer
  - Install USB cable to both machine and computer
  - Place yellow drivers CD into computer
    - Labeled RSP009
  - Follow windows based instructions for completing install.

- **Vpanel Install:**
  - Install Vpanel from same yellow drivers CD

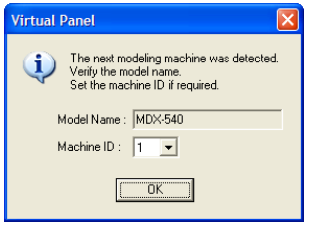
NOTES:

MDX-540 Vpanel

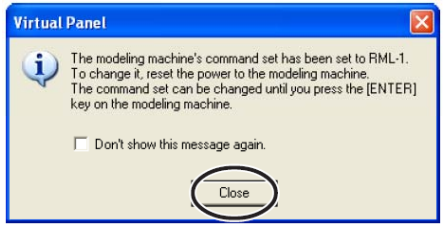
- **Vpanel Use:**
  - Select Roland Vpanel for Modela Pro II from the Start menu.



  - Click OK button.



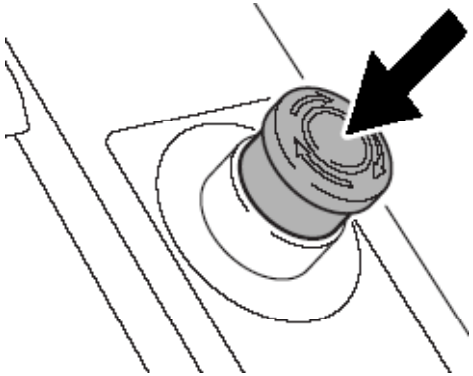
  - Click close when completed.



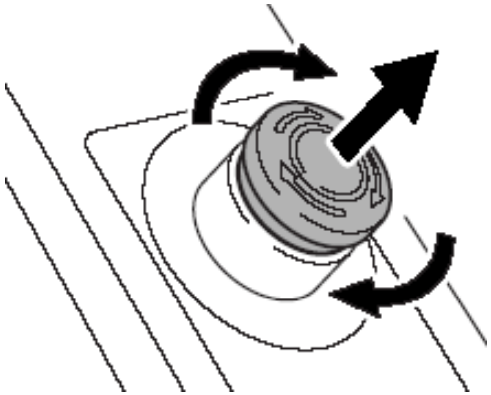
NOTES:

MDX-540 Safety

- Press Emergency Stop button to immediately stop cutting and abort cutting job.



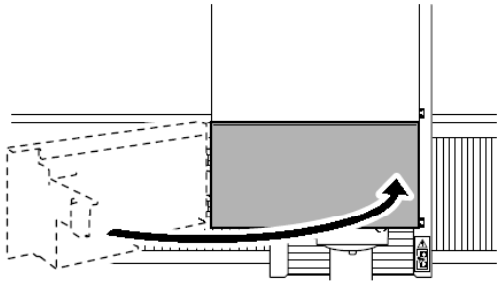
- To remove machine from E-Stop condition, turn off machine and twist button.
- Follow directions for starting machine.



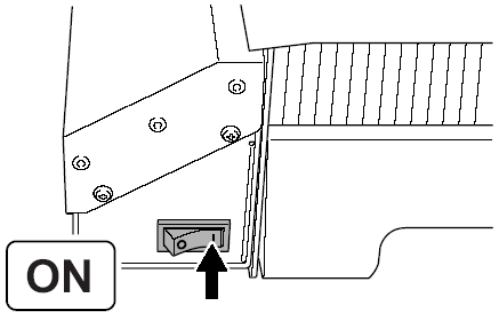
NOTES:

MDX-540 Power On

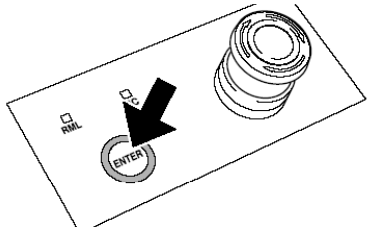
- **Start up sequence**
  - Close spindle cover.



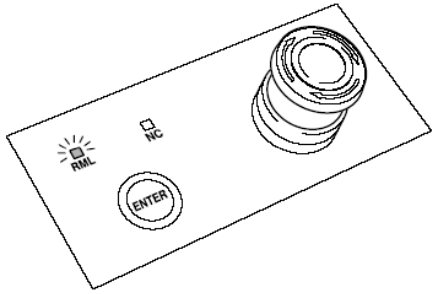
  - Turn on main power.



  - Press Enter when instructed and when machine area is clear.



  - After machine has stopped the origin process, RML light will be on.

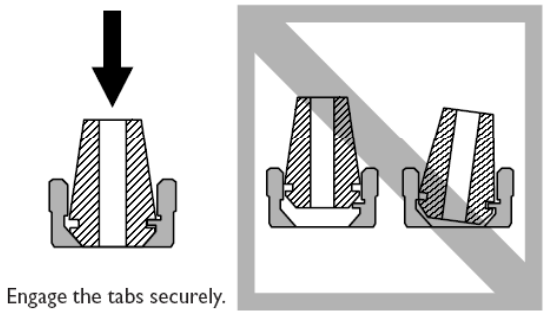


NOTES:

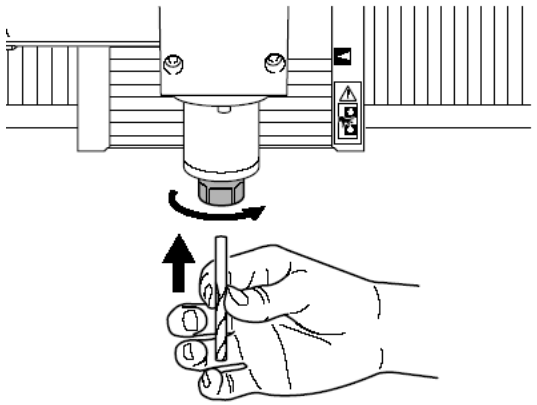
- Please see user's manual for starting machine in NC mode.
- Page 47
- How to Select the Command Mode

Setup Basics – Installing Tool

- Insert collet into nut
  - Make sure its well seated



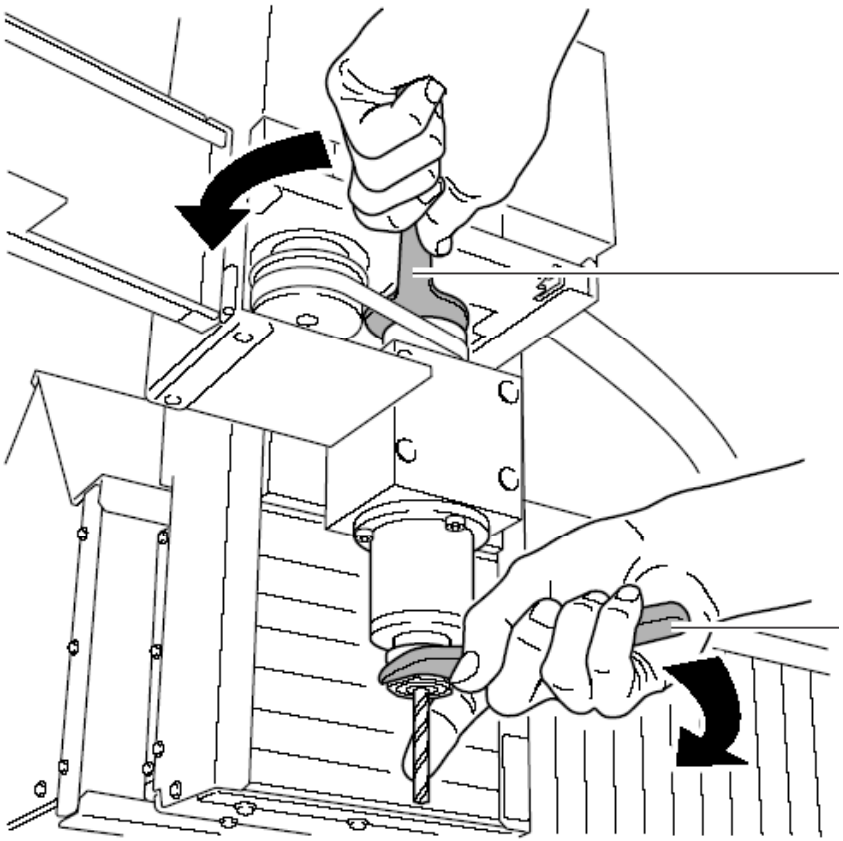
- Lightly tighten nut to hold tool in place



NOTES:

Setup Basics – Installing Tool

- Support tool with finger tip as you tighten tool using 24mm & nut wrench.

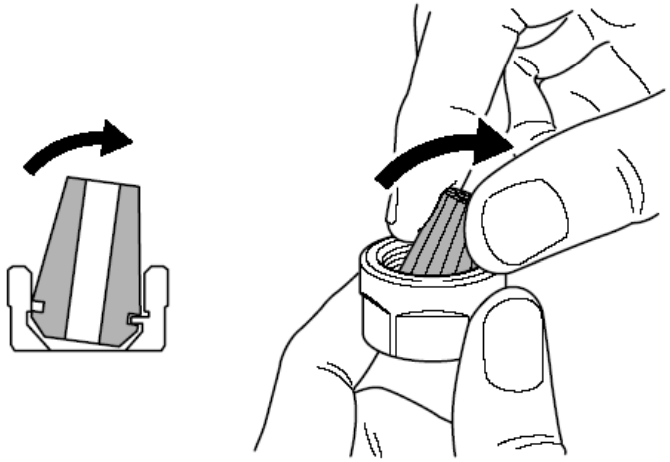


NOTES:

•If tool is not supported, tool could fall and break.

Setup Basics – Installing Tool

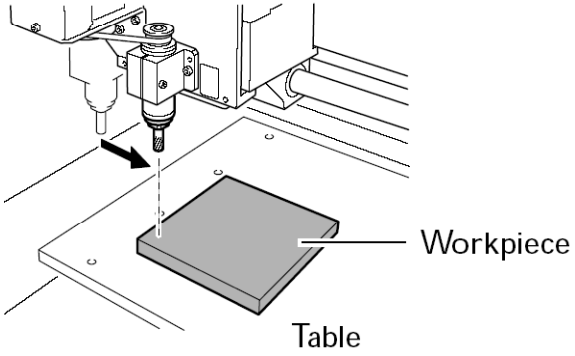
- To remove collet, remove nut and tip collet sideways to loosen.



NOTES:

MDX-540 Adding Material

- Fix material to MDX-540 table using either Roland AS-10 sheets or heavy traffic double sided carpet tape.



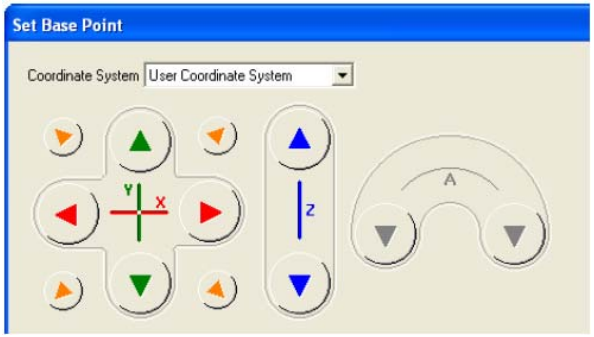
NOTES:

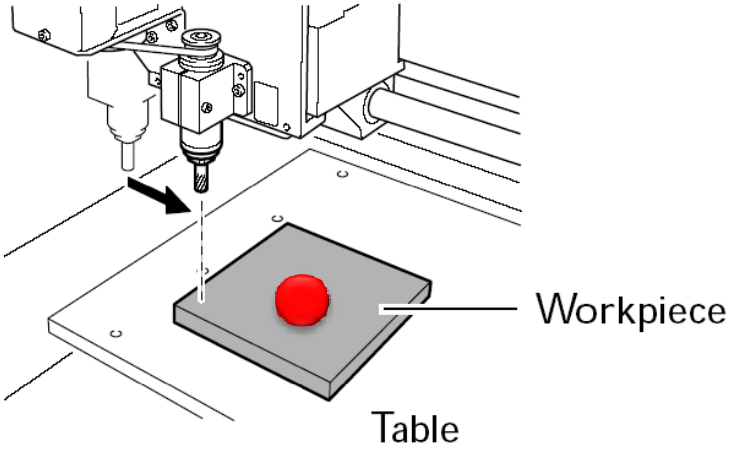
- Double sided carpet tape can be purchased at local hardware store such as Home Depot and Ace Hardware.
- Best tape is fabric based tape not foam or fiberglass type tape.
- For milling plastics and tooling board, double sided tape will hold objects in place.
- For milling tougher materials such as aluminum and brass, better fixturing is required.

Please see resources for more information

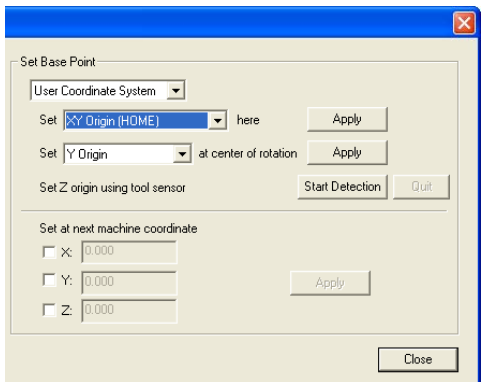
MDX-540 Setting Origin Points

- Move tool to origin point selected in software.
  - Usually the center of the material. (Red dot)
  - **Make sure your coordinate system is set to User Coordinate.**





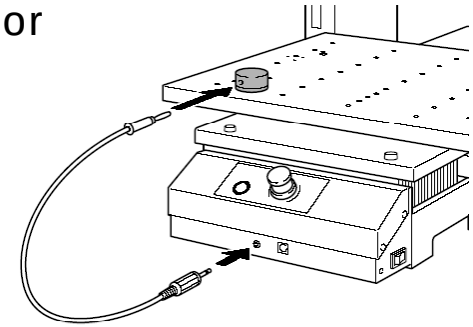
  - Set origin point at this location using Vpanel and selecting "Set XY Origin (Home) here".
  - Click Apply
  - Click Close to close window.



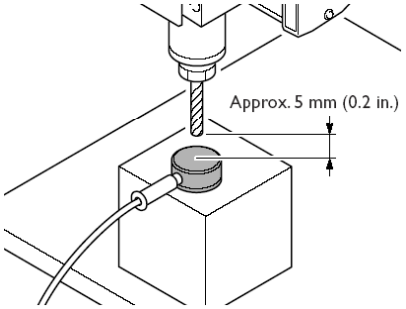
NOTES:

MDX-540 Setting Origin Points

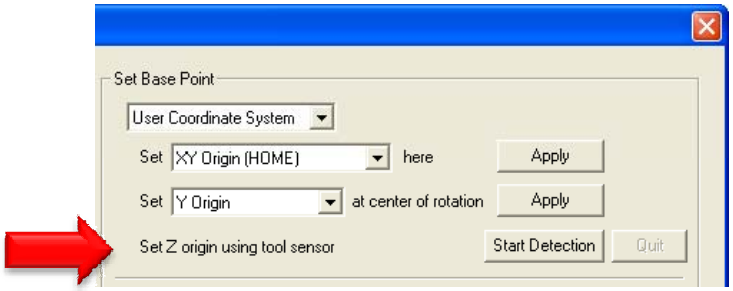
- Place Z0 sensor above material, connect sensor cable to the sensor and Z0 connector



- Move tool so that it is right above the sensor about .200” - .250”



- Click on “Set Z origin using tool sensor” and click on Start Detection.

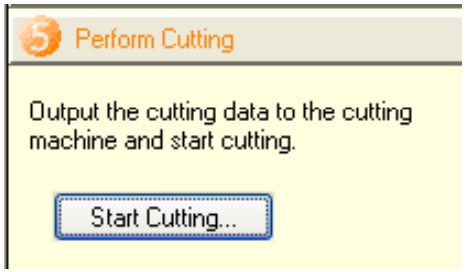


NOTES:

•New MDX-540’s have a sensor connector more securely connected to the machine.

MDX-540 Setting Origin Points

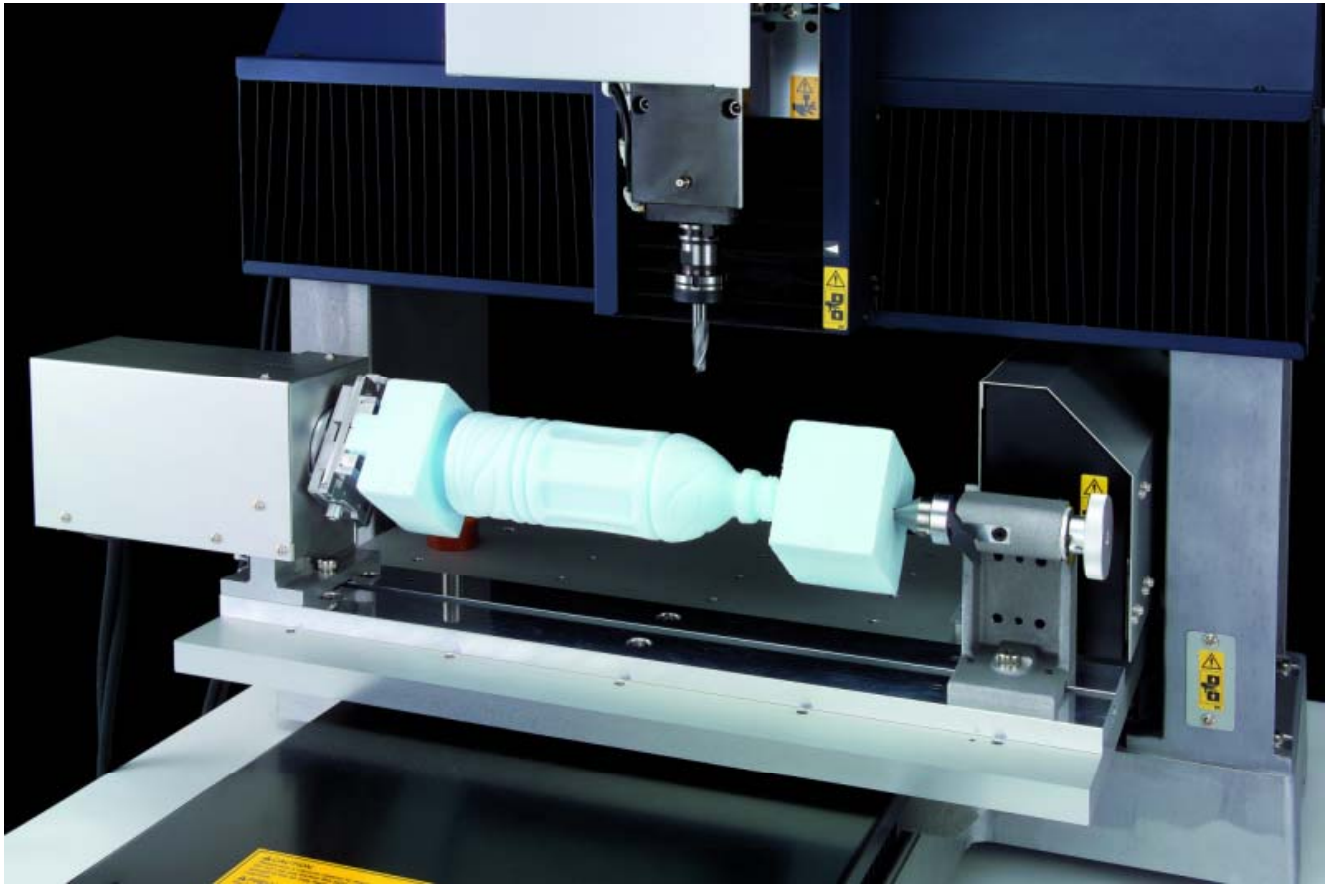
- After tool touches sensor, remove sensor from cutting area.
- Machine is now set up and ready to receive commands from SRP Player or other CAM software.
  - Press “Start Cutting” in SRP Player to start machine.



NOTES:

ZCL-540 Rotary Axis

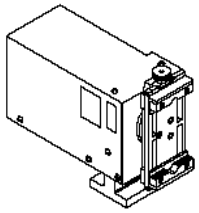
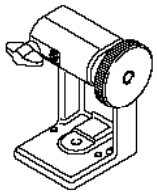
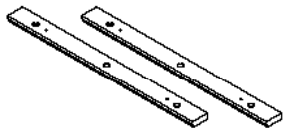
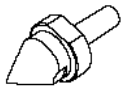
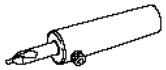
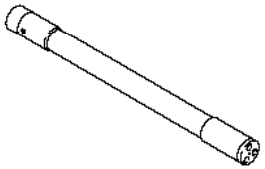
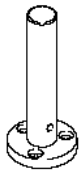
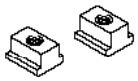
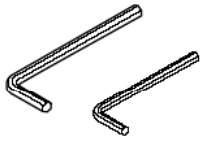
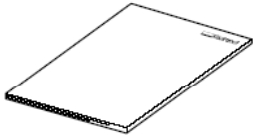
- Allows you to cut objects and rotate them automatically.
  - Large cutting area.
    - 7.0” Diameter by 14.6” Length



NOTES:

What's Included

- All items included with optional ZCL-540.

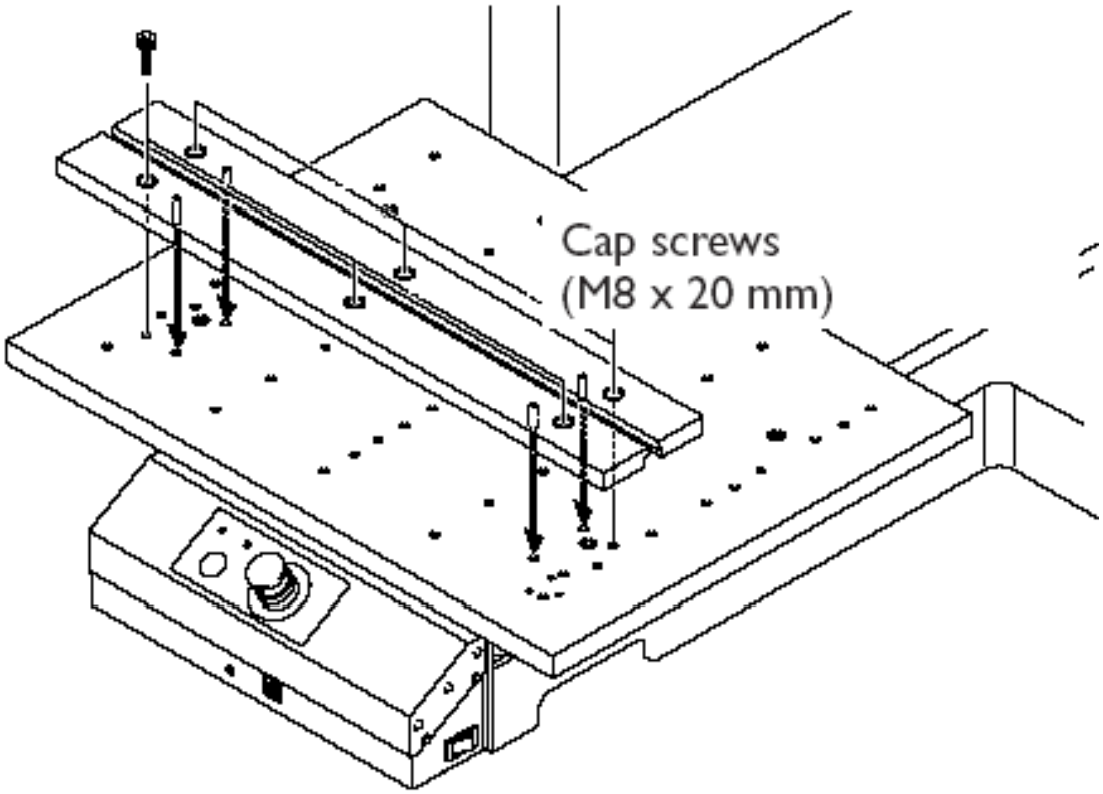
 Drive unit	 Tailstock	 Base plates x2 (*1)	 Live center
 Center drill	 Y-origin sensor	 Z-origin sensor	 Spacer (*1)
 Origin-detection pin (diameter 6 mm)	 Cap screws (M8 x 20 mm) x8 (*2)	 Cap screws (M4 x 30 mm) x3 (*1)	 Cap screws (M4 x 15 mm) x3 (*3)
 T-slot nuts x2	 Hexagonal wrenches (6 mm, 3 mm)	 Retaining band	 User's Manual (this manual)

NOTES:

•Please be familiar with the names of all the accessories listed here.

ZCL-540 Setup

- Install base plates to table using provided screws.
  - **Do not install if you have the T-Slot Table.**



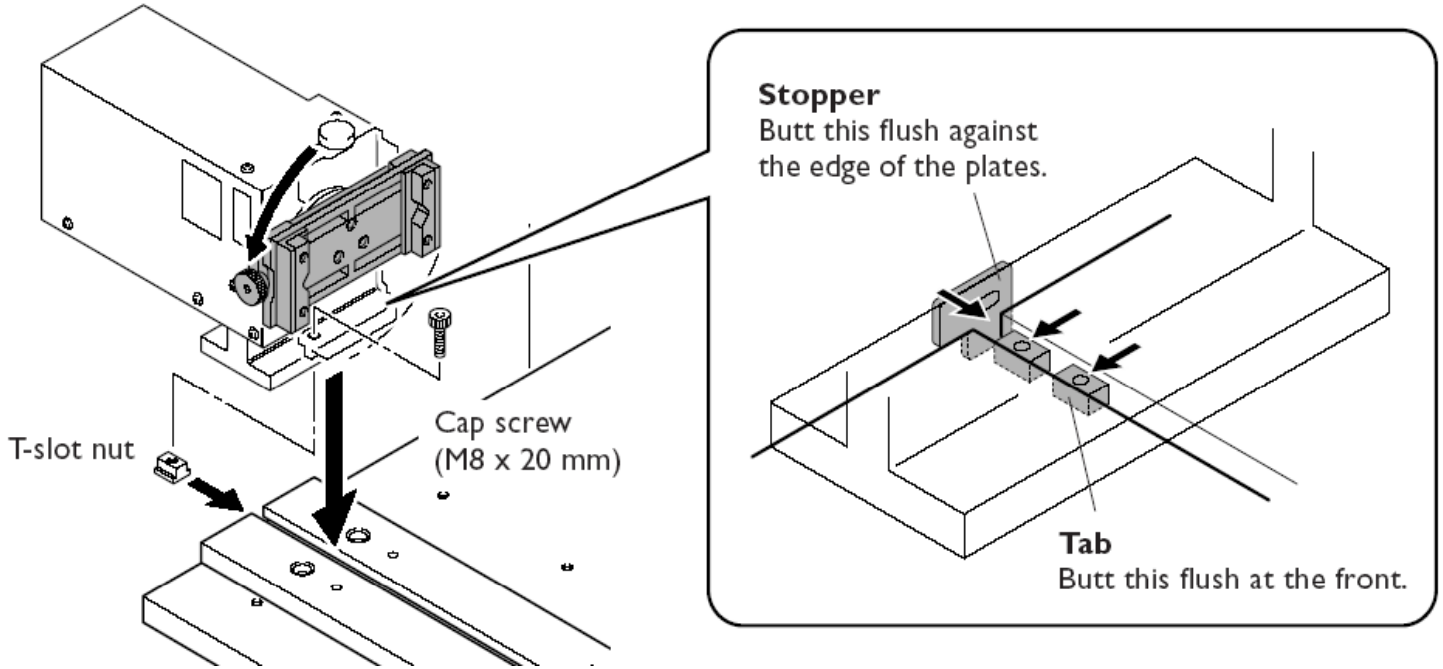
NOTES:

- Make sure machine is switched off before installing ZCL-540 rotary axis unit.
- Disconnect the power cord.

- **Plates not used with the T-Slot table. All other instructions will be the same unless noted.**

ZCL-540 Setup

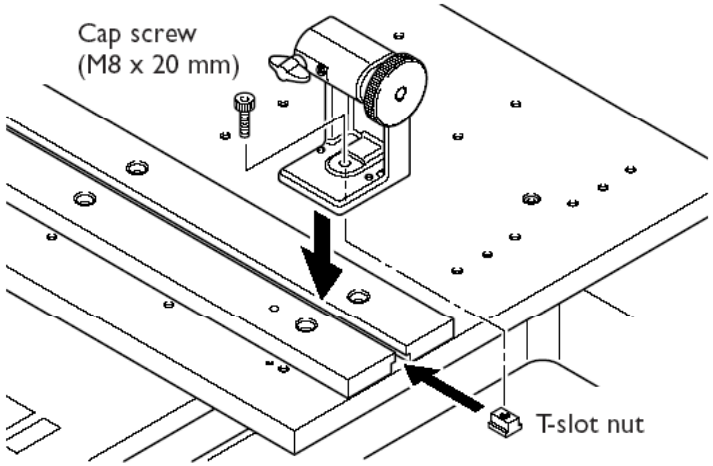
- Gently turn clamp side ways and install on base plates.
  - Ensure stopper is flush against table edge.



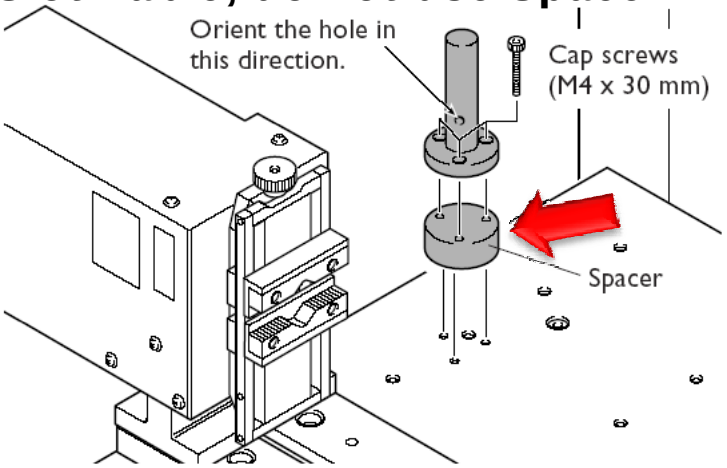
NOTES:

ZCL-540 Setup

- Install live center as shown.



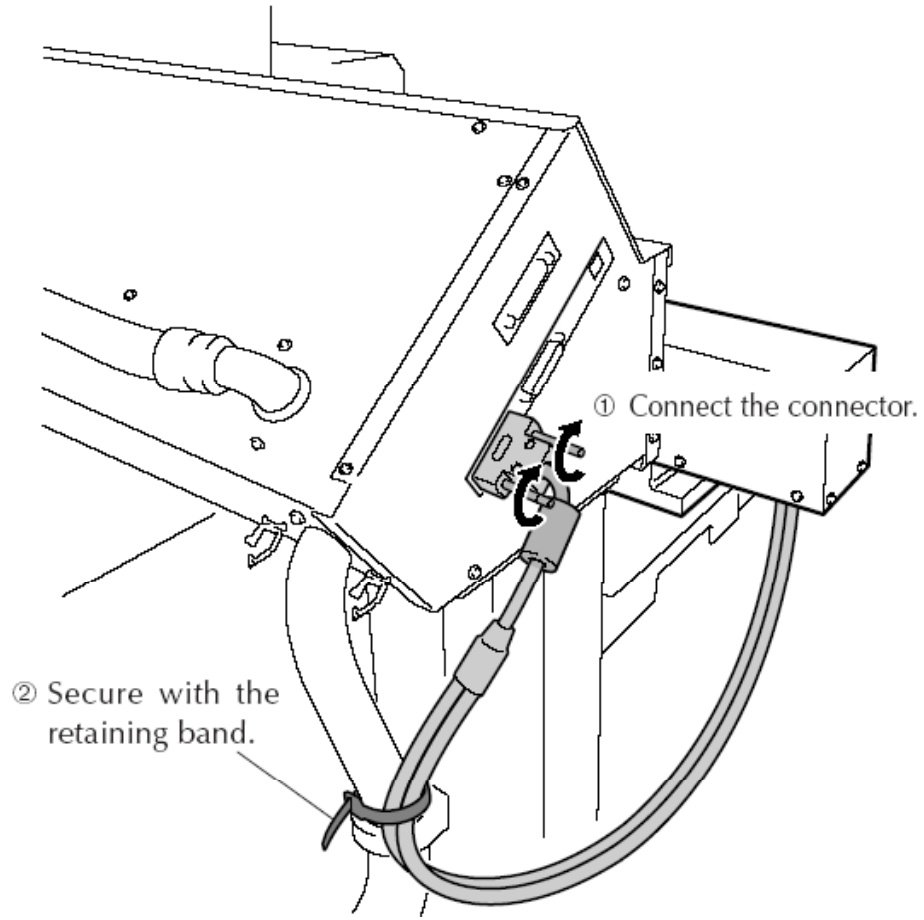
- Next install Z 0 sensor.
  - **If using T-Slot Table, do not use Spacer.**



NOTES:

ZCL-540 Setup

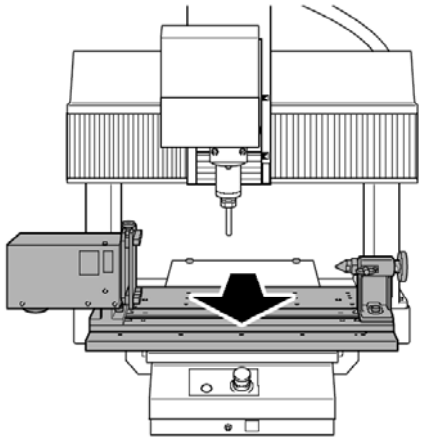
- Connect connector to correct location on machine.
- Secure with provided reusable strap.



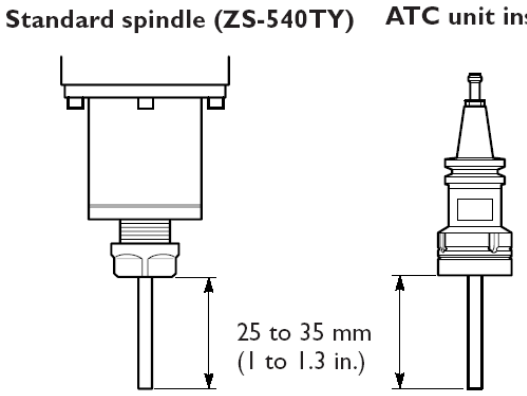
NOTES:

ZCL-540 Setup, Setting Origins

- Use either Vpanel or Handy panel to move table forward.



- Install 6mm Origin Detection Pin in spindle.
  - If the machine has an ATC, please load the 6mm pin in the tool holder and install in Stock Location #1.

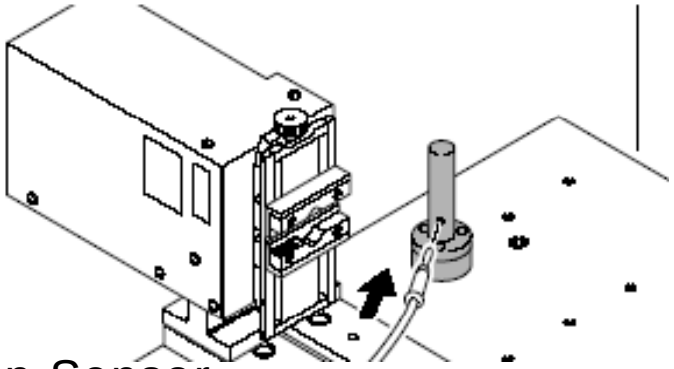


NOTES:

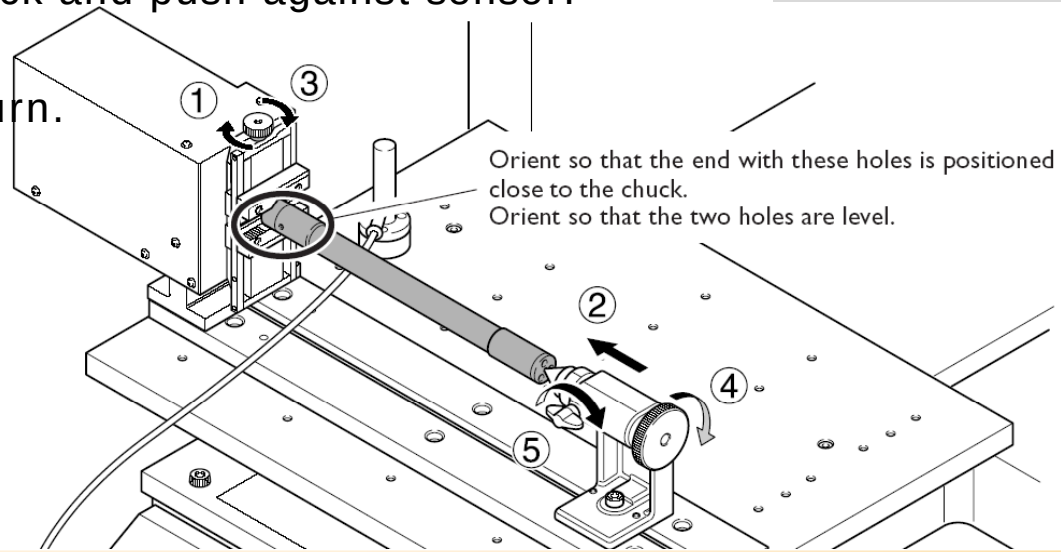
•Please insure that the tool is out about 1 to 1.3 inches (25 to 35mm).

ZCL-540 Setup, Setting Origins

- Connect sensor cable to Z-Origin Sensor.



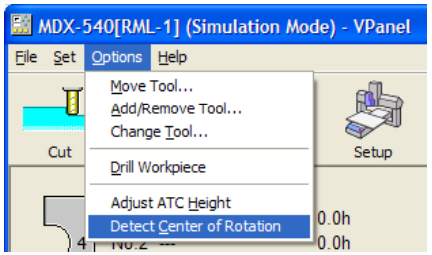
- Install Y-Origin Sensor.
  1. Loosely tighten the clamp.
  2. Place live center in tailstock and push against sensor.
  3. Tighten clamp.
  4. Turn livestock clamp ½ turn.
  5. Tighten retaining knob.



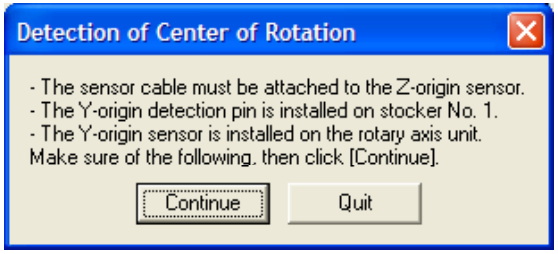
NOTES:

ZCL-540 Setup

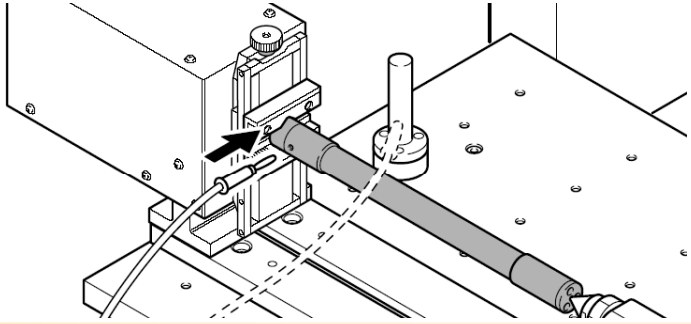
- Go to Vpanel and select “Detect Center of Rotation”.

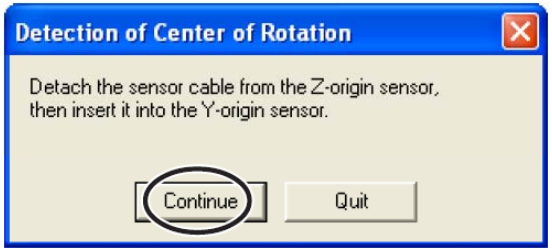


- Ensure the following and press “Continue” to start process.



- When instructed to do so, remove cable from Z-Origin sensor and insert in Y-Origin sensor then press “Continue”.

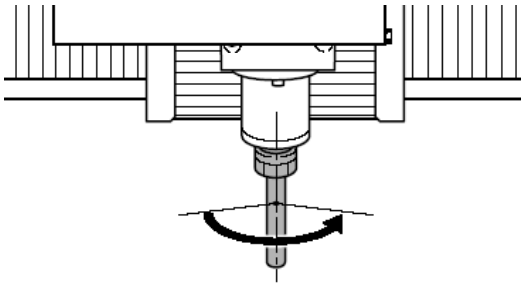


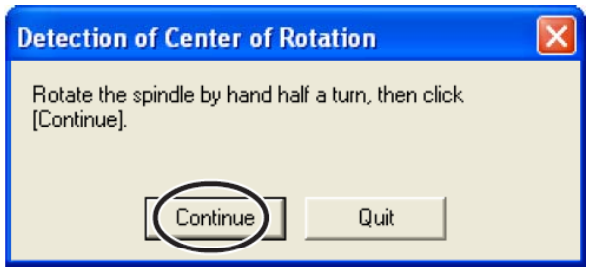


NOTES:

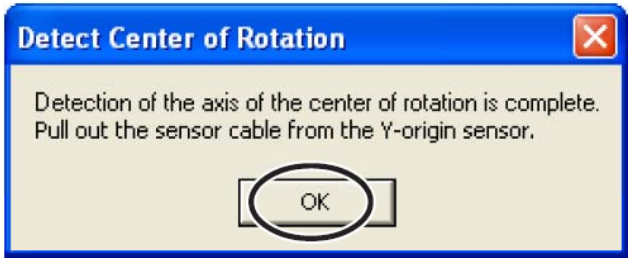
ZCL-540 Setup

- When instructed to rotate the spindle by half a turn, turn the tool by half a rotation then press “Continue”.





- When completed, remove the sensor cable and Y-Origin sensor and press “OK”.

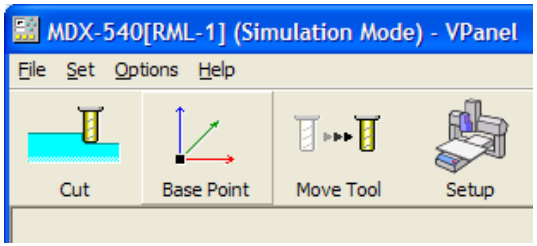


- **Although it appears as if we have finished, there are two critical steps left. Not completing the next two items will cause the rotary axis to cut incorrectly**.

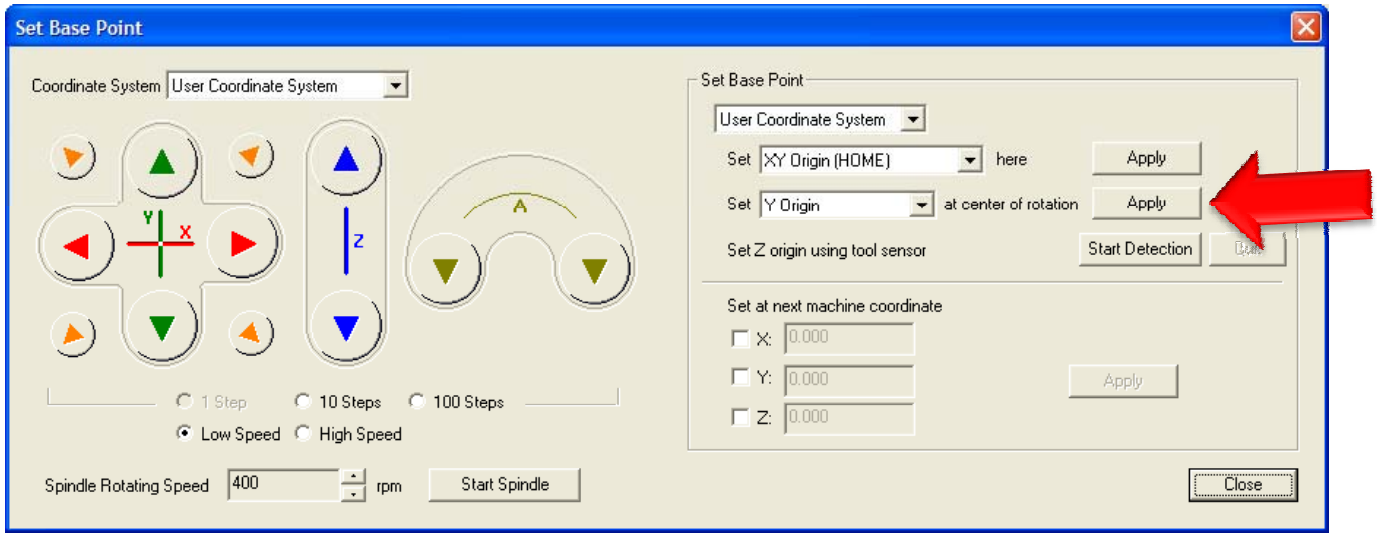
NOTES:

ZCL-540 Setting Y-Axis Origin

- To complete setting the Y-Axis origin, click on “Base Point”.



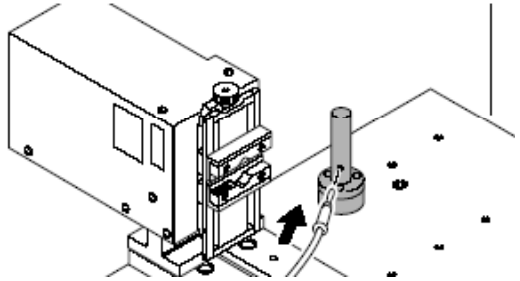
- Click on Set Y Origin at center of rotation “Apply” button.
  - This will set the Y-Origin to the position scanned by the previous steps.



NOTES:

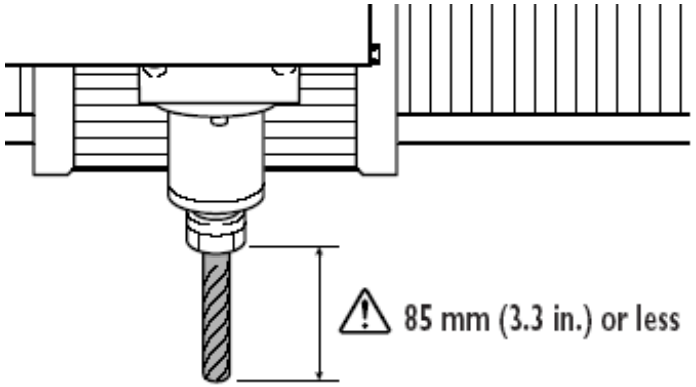
ZCL-540 Setting Z-Axis Origin

- Connect sensor cable to Z-Origin sensor.



- **If you have an Automatic Tool Changer (ATC), install at least one tool, and measure the length of the tool**.

- Install a tool in the spindle or if you have an ATC unit, pick up a tool whose length has been measured.

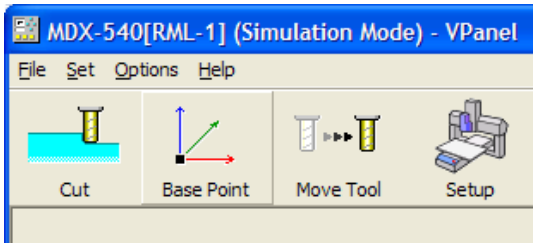


NOTES:

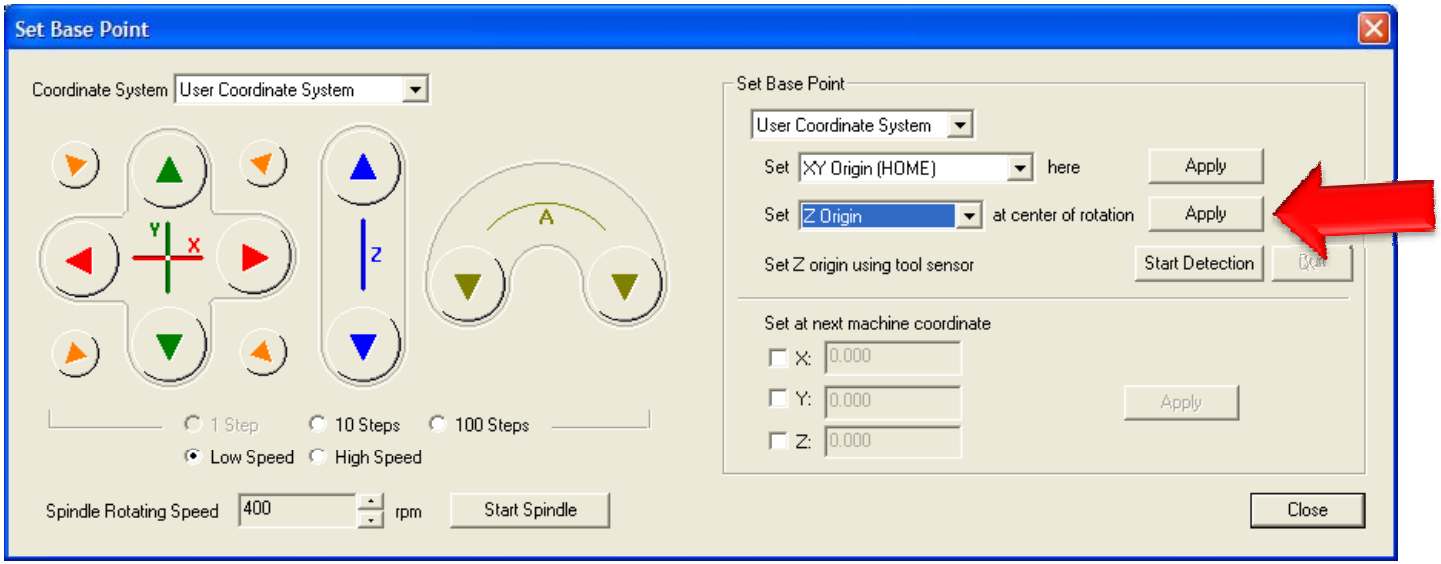
•Failing to measure the length of the tool or performing this step will cause the machine to cut too deep in the material or not cut the material at all.

ZCL-540 Setting Z-Axis Origin

- Click on “Base Point” within the VPanel.



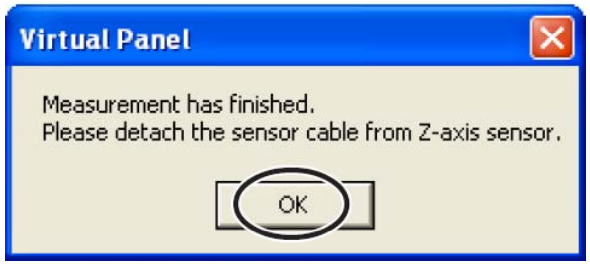
- Click on Set Z Origin at center of rotation “Apply” button.



NOTES:

ZCL-540 Setting Z-Axis Origin

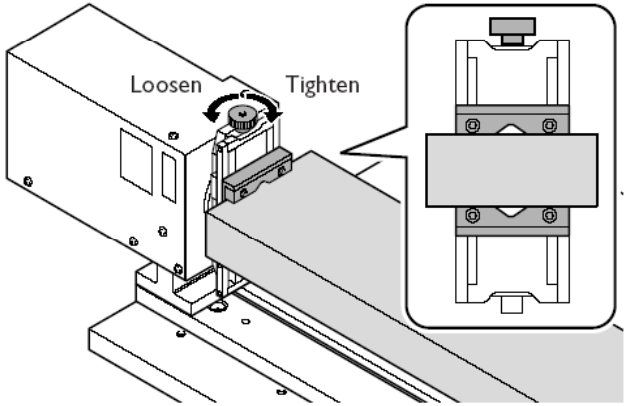
- After the machine has finished measuring the length of the tool disconnect the sensor cable and click “OK”.

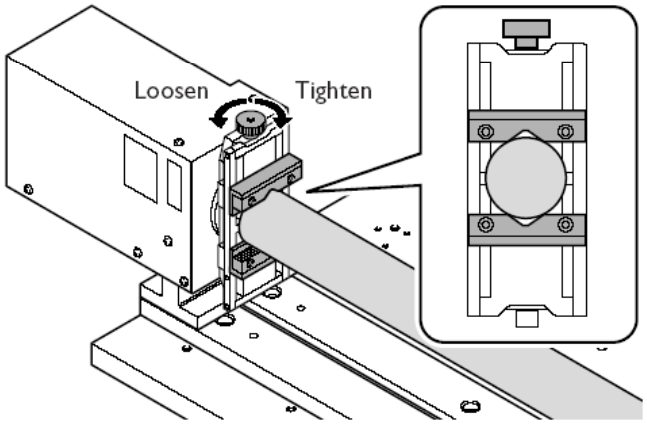


NOTES:

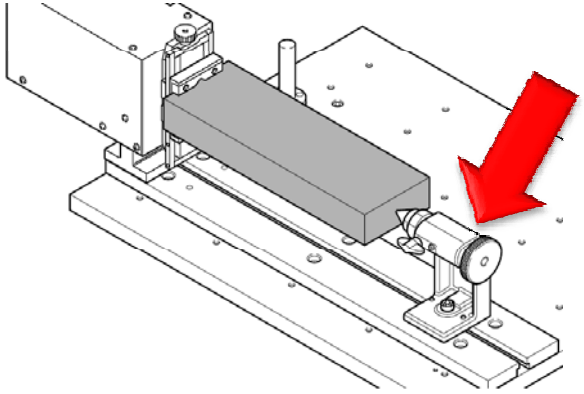
ZCL-540 Operation

- The rotary axis clamp can hold both square material and round material.





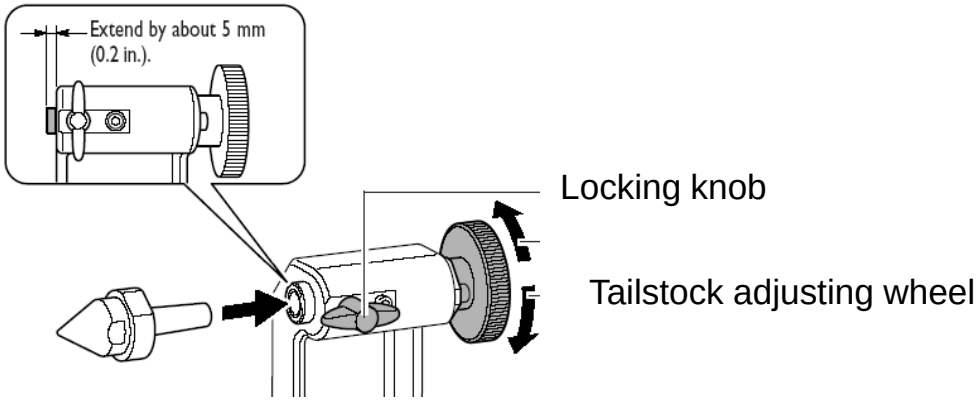
- The Tailstock will be used to support the material during cutting. It will be used with the center drill and live center.



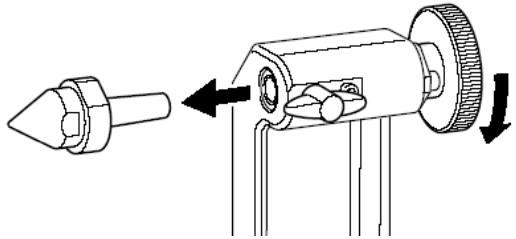
NOTES:

ZCL-540 Operation

- Installing Live Center and/or Center Drill.
  - First extend the tailstock about 0.2 inch (5mm).
  - Next insert either the live center or center drill.
  - Extend the tailstock holder by turning the adjusting wheel.
  - Turn knob to lock in place.



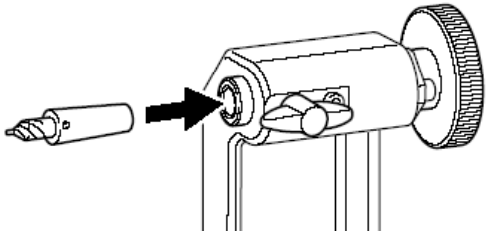
- Removing Center Drill or Center Drill.
  - Remove live center or center drill by retracting the tailstock.



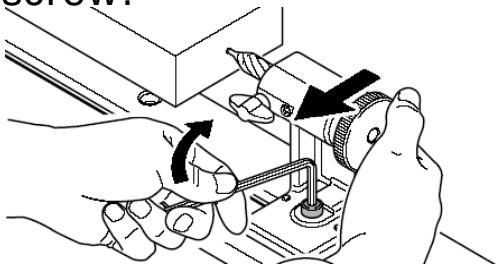
NOTES:

ZCL-540 Operation

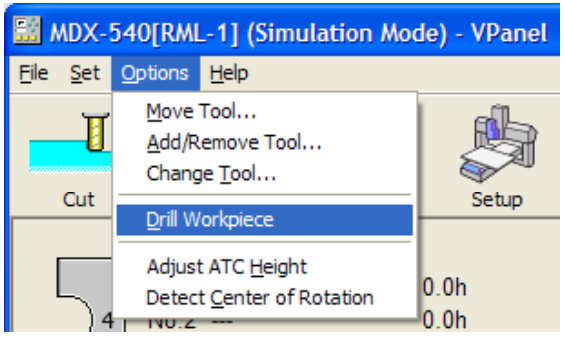
- Drilling Center Hole on Material.
  - Attach center drill.



  - Slide tailstock and drill until drill touches the material.
  - Tighten retaining screw.



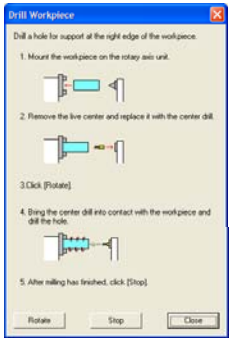
  - In the Vpanel, select “Drill Workpiece”.



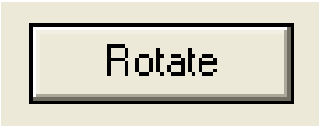
NOTES:

•The center hole is a small hole or notch on the end of the material for the live center to hold the material in place.

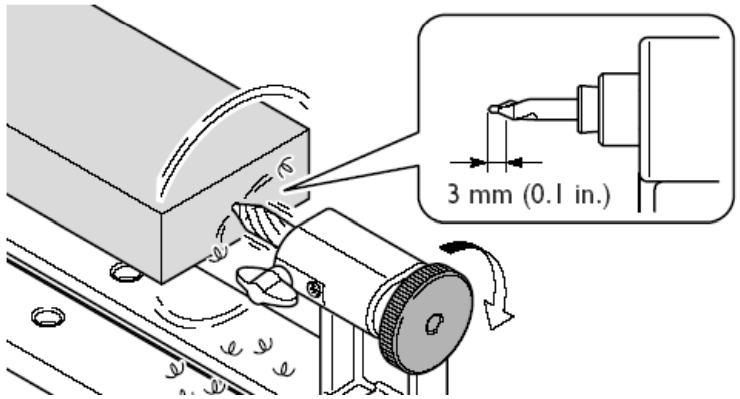
ZCL-540 Operation



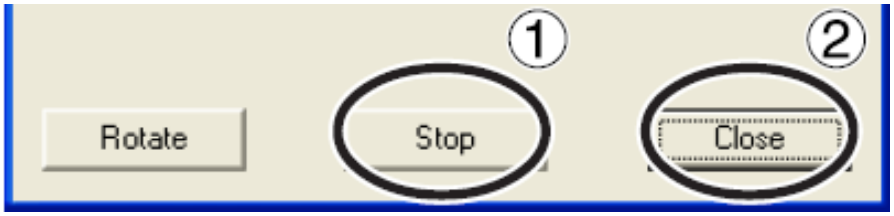
- The Drill Workpiece window will open.
- Click on “Rotate” to start rotating the material.



- Slowly turn the adjusting dial to cut a hole 0.1 in (3mm) deep.



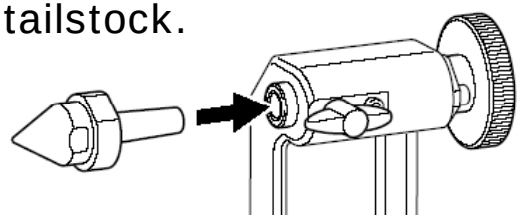
- Once completed, click on “Stop” then “Close”.



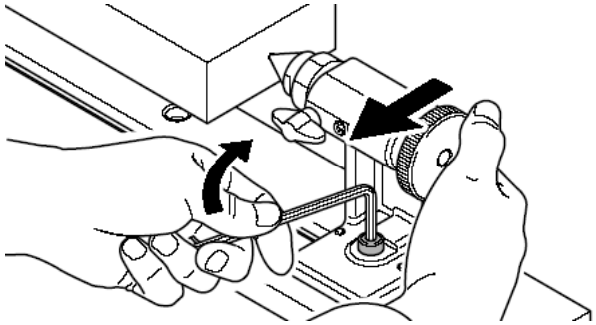
NOTES:

ZCL-540 Operation

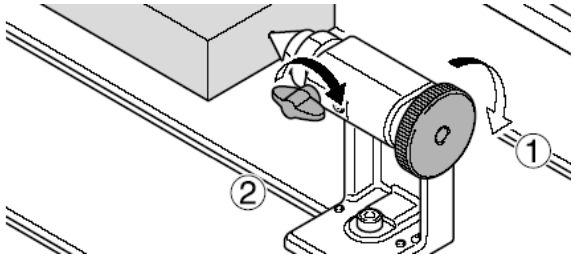
- Live Center Installation
  - Install live center to tailstock.



  - Slide tailstock and live center until the live center goes in the center hole previously cut in material.
  - Tighten retaining screw.

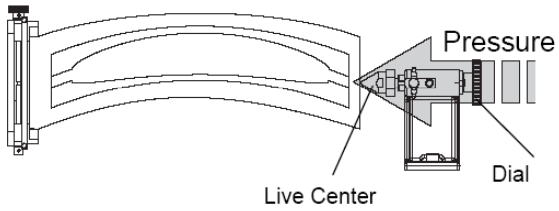


1. Rotate dial half a turn.
2. Tighten knob to secure material.



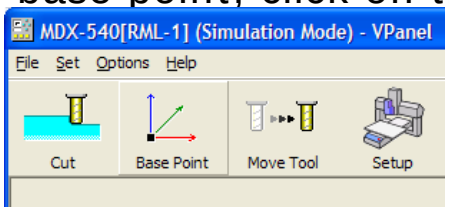
NOTES:

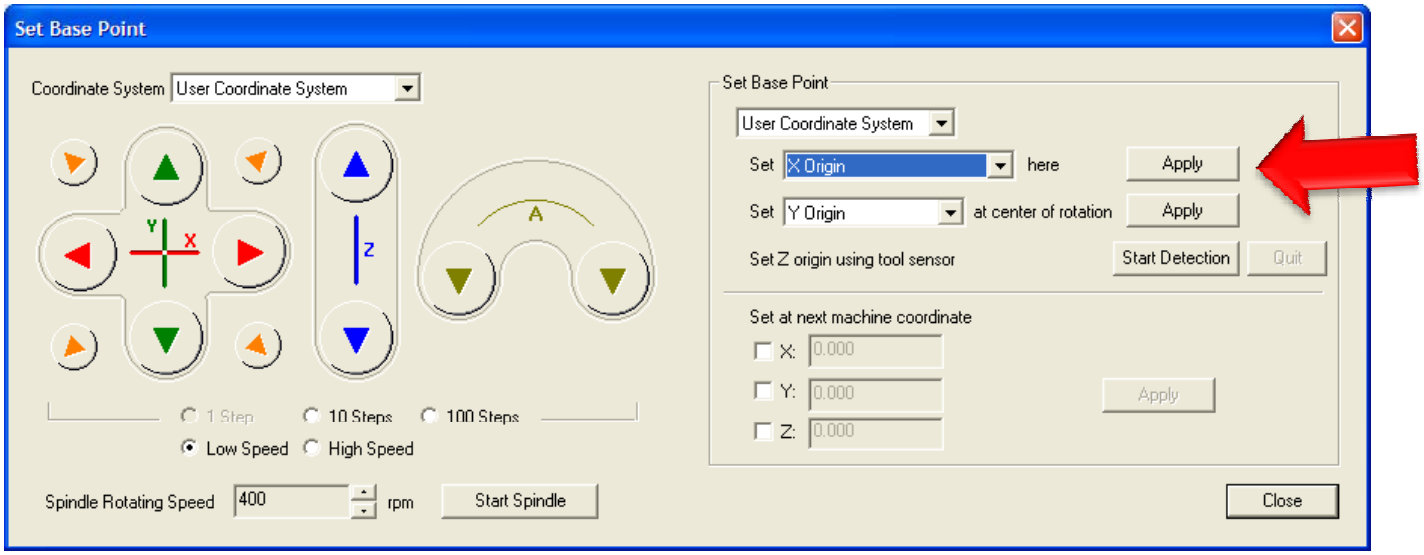
•Be careful not to over tighten the adjusting dial.
•Over tightening could cause the material to warp causing inconsistent cutting.



ZCL-540 Operation

- The MDX-540 and ZCL-540 unit are now ready.
- **Please note that you only need to set the X-Origin before starting your program. The Z-Origin and Y-Origin have been set. Set only the X-Origin.**
  - To set the origin, move the tool left or right to the desired location and under base point, click on the Set X-Origin here "Apply" button.

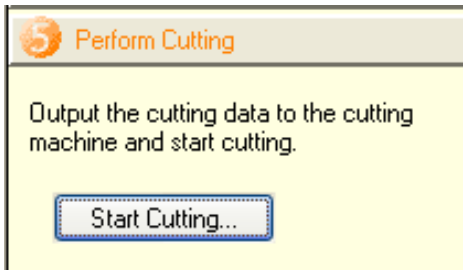


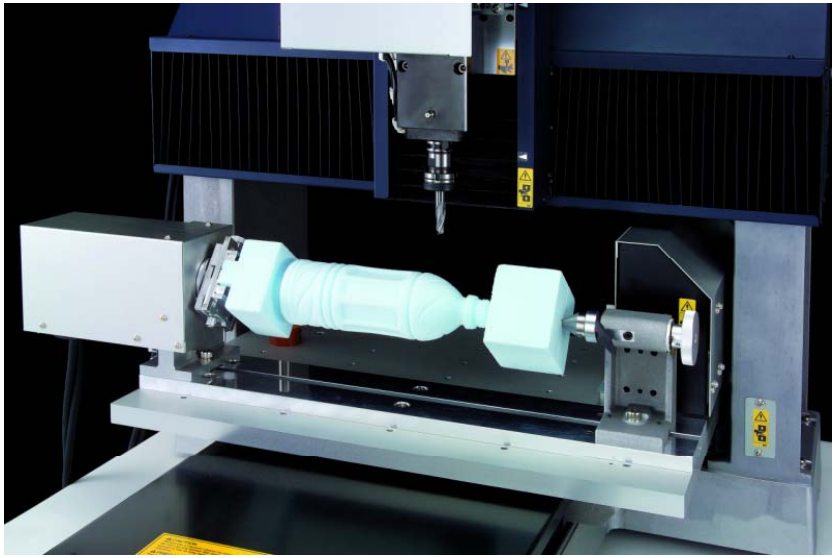


NOTES:

ZCL-540

- The MDX-540 & ZCL-540 are now ready to receive commands from software program.
  - Press “Start Cutting” in SRP Player to start machine.



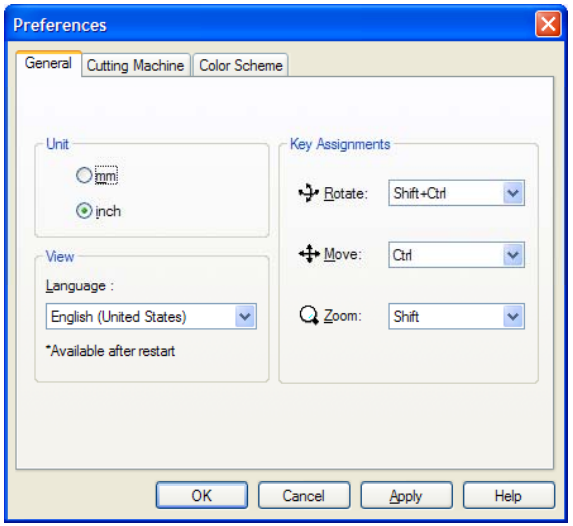


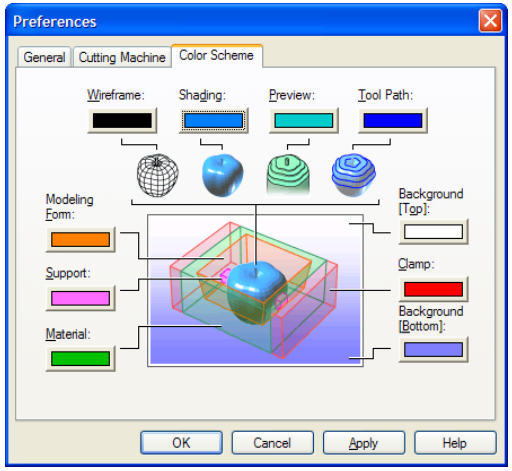
NOTES:

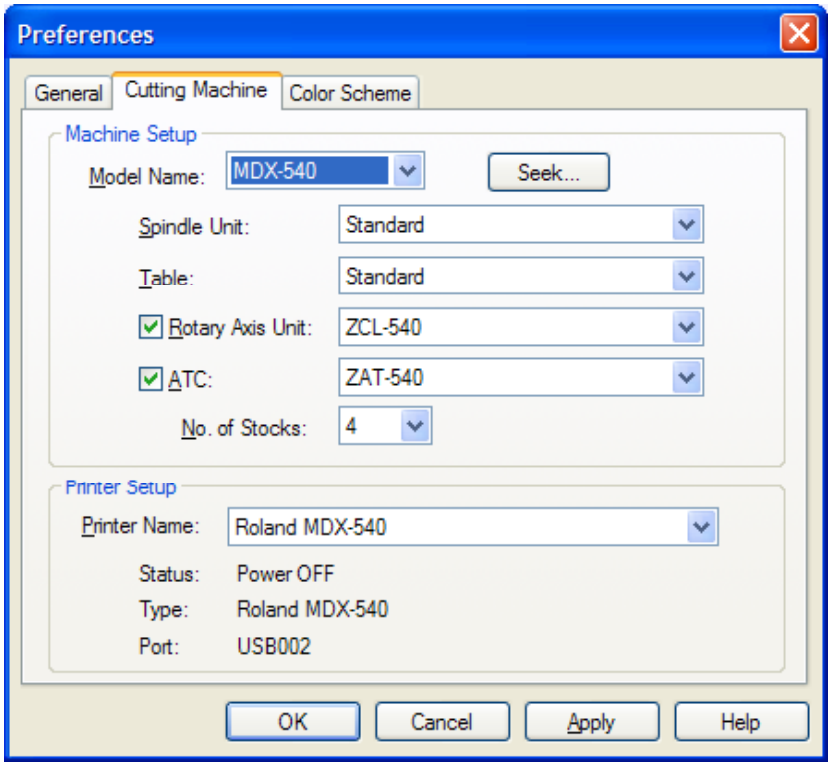
SRP Player CAM Software

SRP Player

- File - Preferences





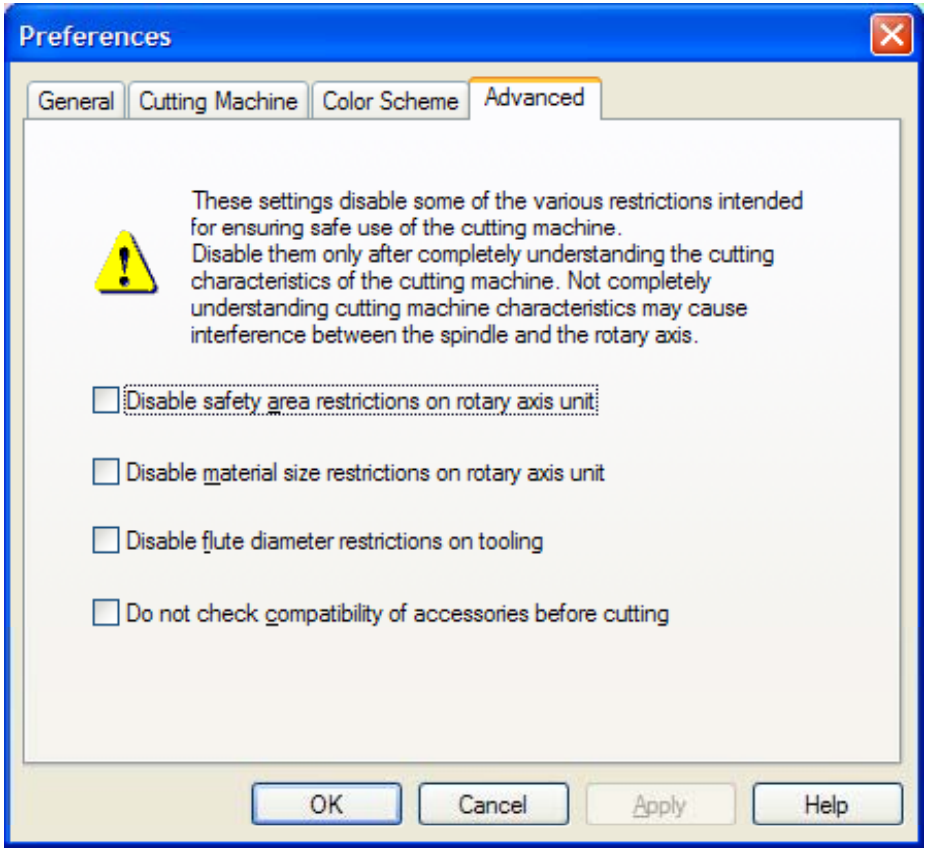


NOTES:

You can change your preferences, color scheme, machine and accessories in this section.

SRP Player

- File – Preferences – Advanced Tab

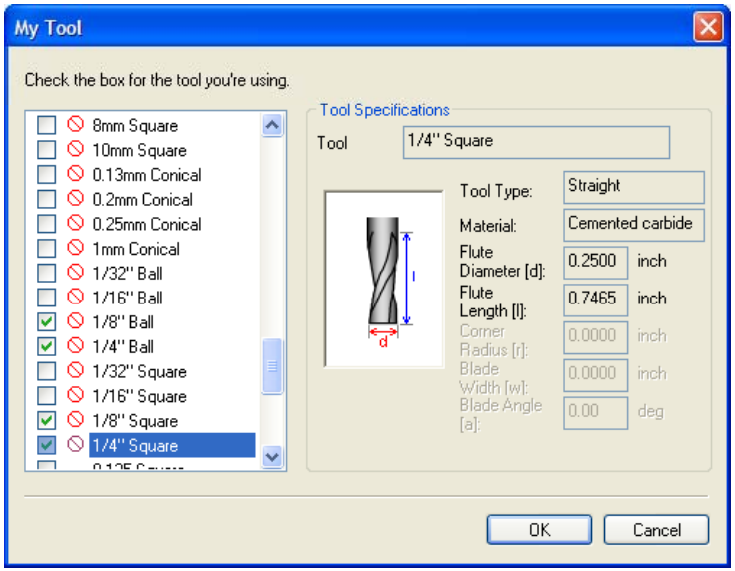


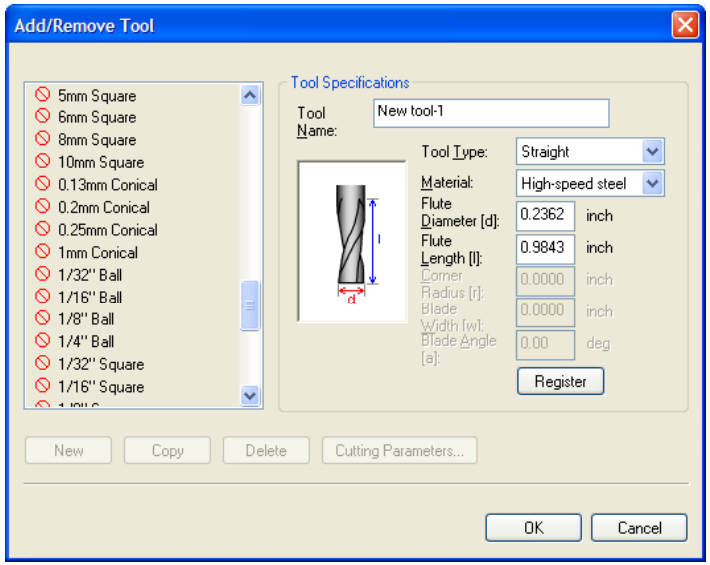
NOTES:

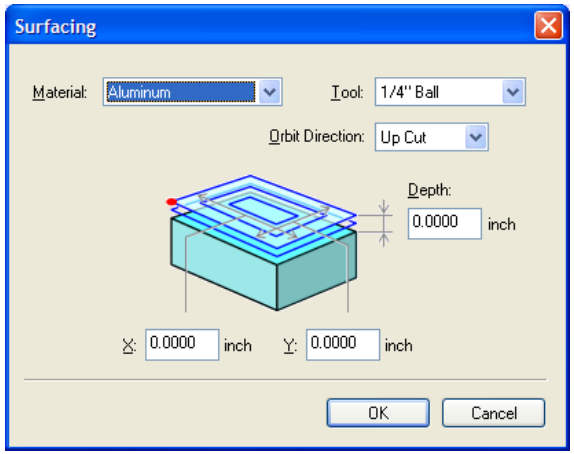
- For software versions 1.15 and greater, there is an advanced tab that will allow you to disable certain safety features for advanced users.
- Please be very familiar with the machine and any accessory before disabling these restrictions.
- Failure to do so may cause a crash.

SRP Player

- Options







NOTES:

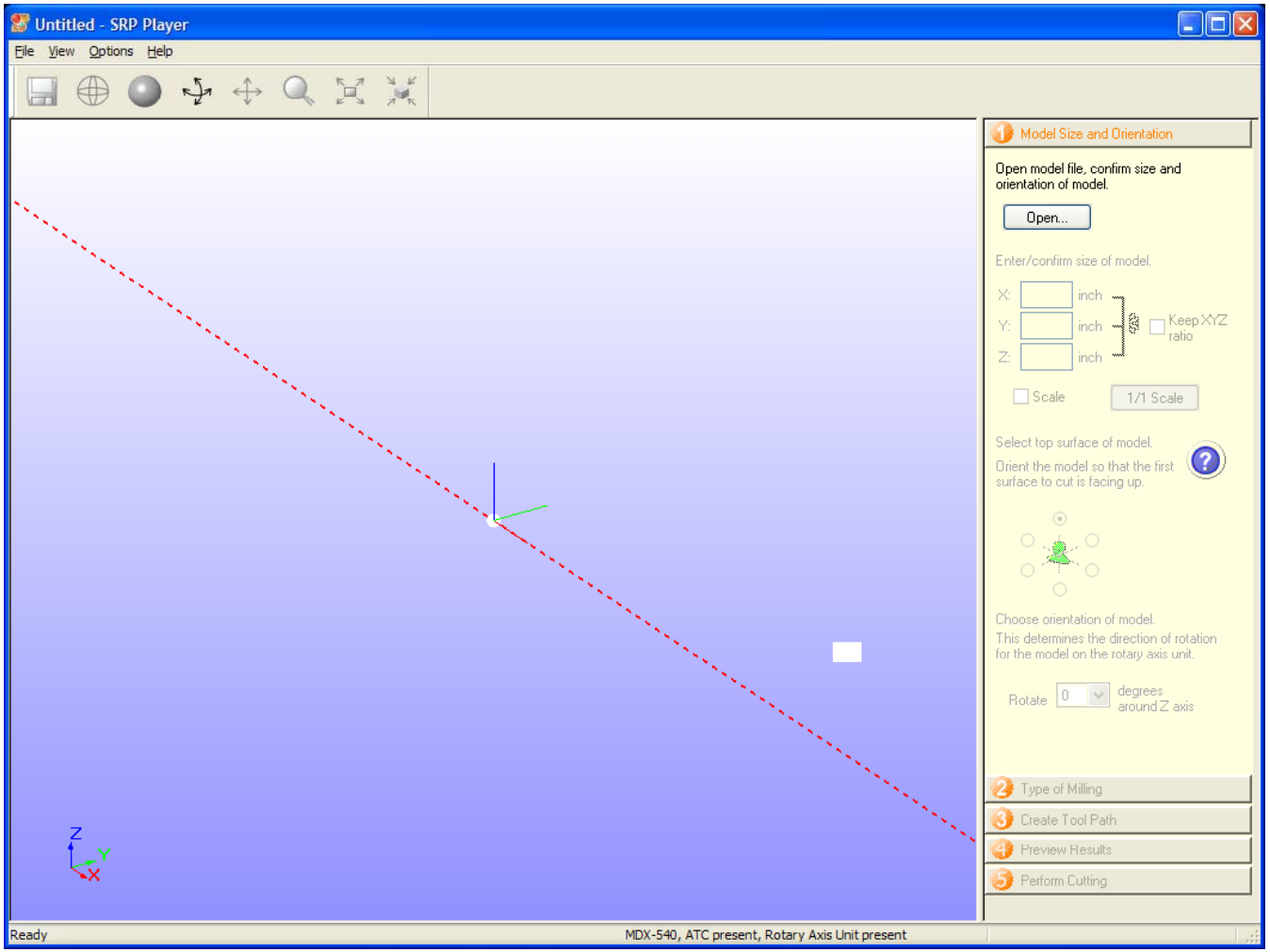
My Tool: Select what tools you have available

Add/Remove Tool: Add or remove additional tools than already installed.

Surfacing: Surfaces work material using available tools.

SRP Player

- Main Screen

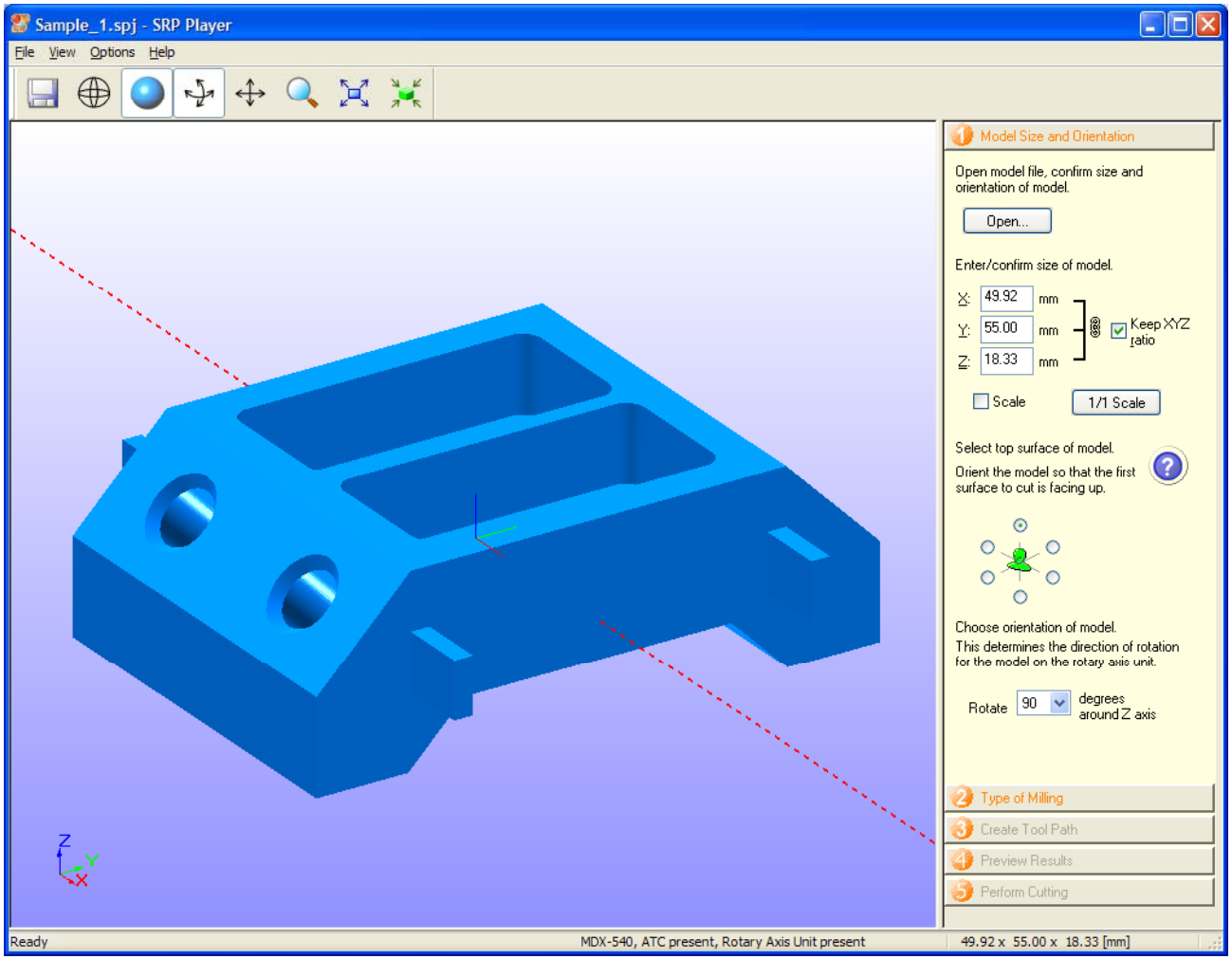


NOTES:

- Start screen. Note you can't proceed until Step 1 is completed.
- Red line demonstrates rotary axis rotation axis if available.

SRP Player

- Step 1

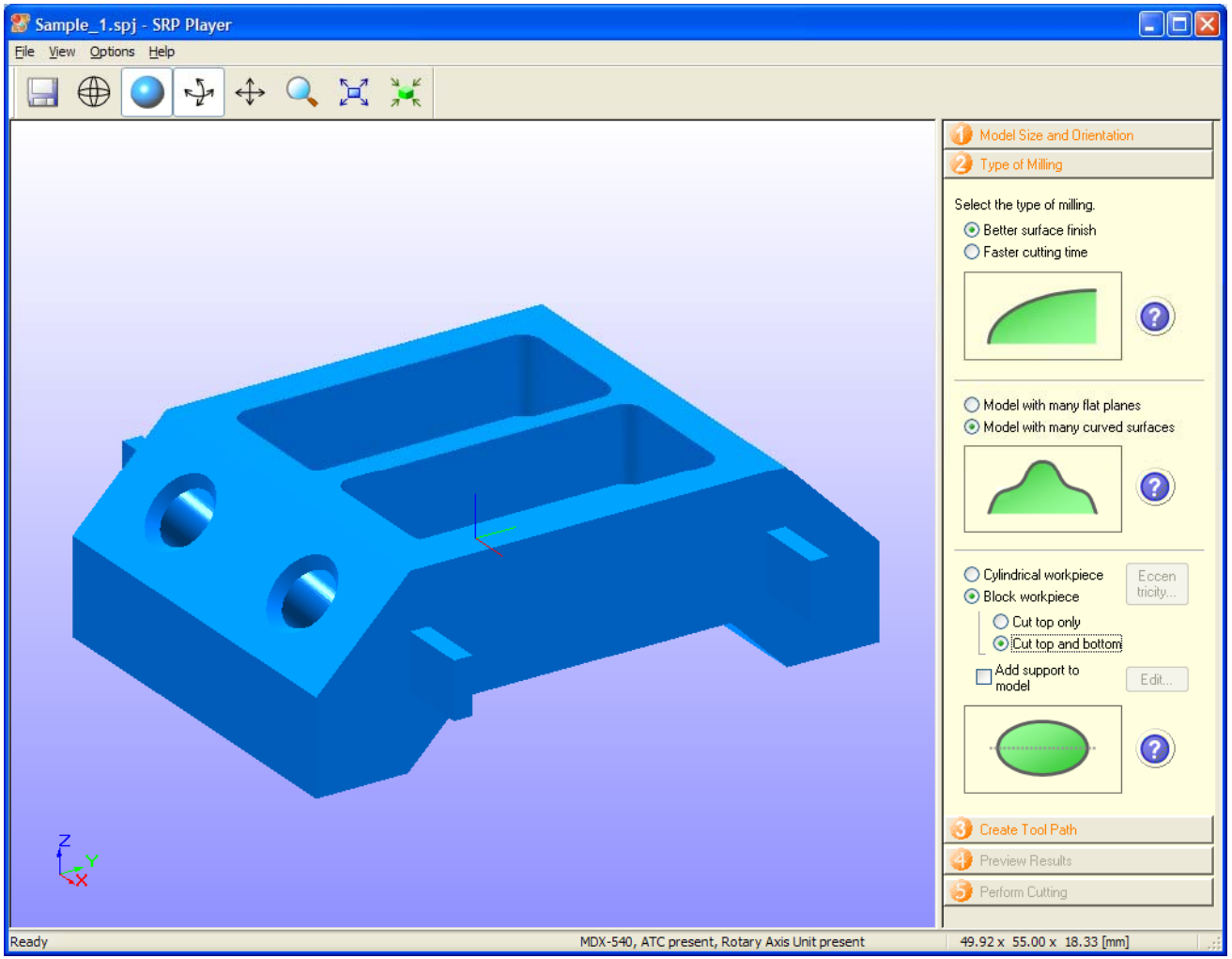


NOTES:

- Import part by clicking on Open or dragging part onto screen.
- Confirm size of part.
  - Modify if desired.
- Check orientation of part.
- Click on Step 2 when finished.

SRP Player

- Step 2

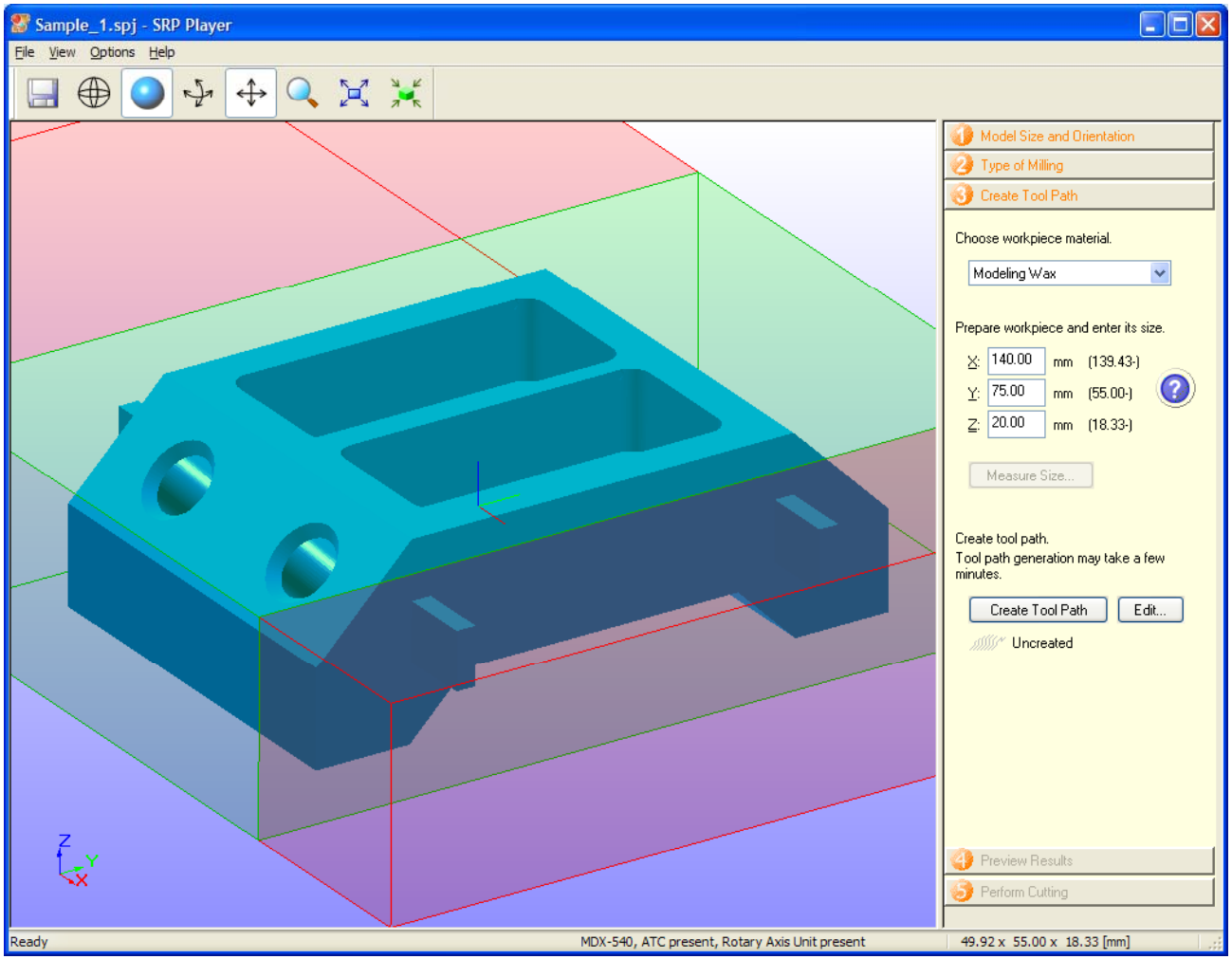


NOTES:

- You select what type of part you will be cutting by selecting the appropriate options.
- Click on question mark for more information.
- Click on Step 3 when finished.

SRP Player

- Step 3

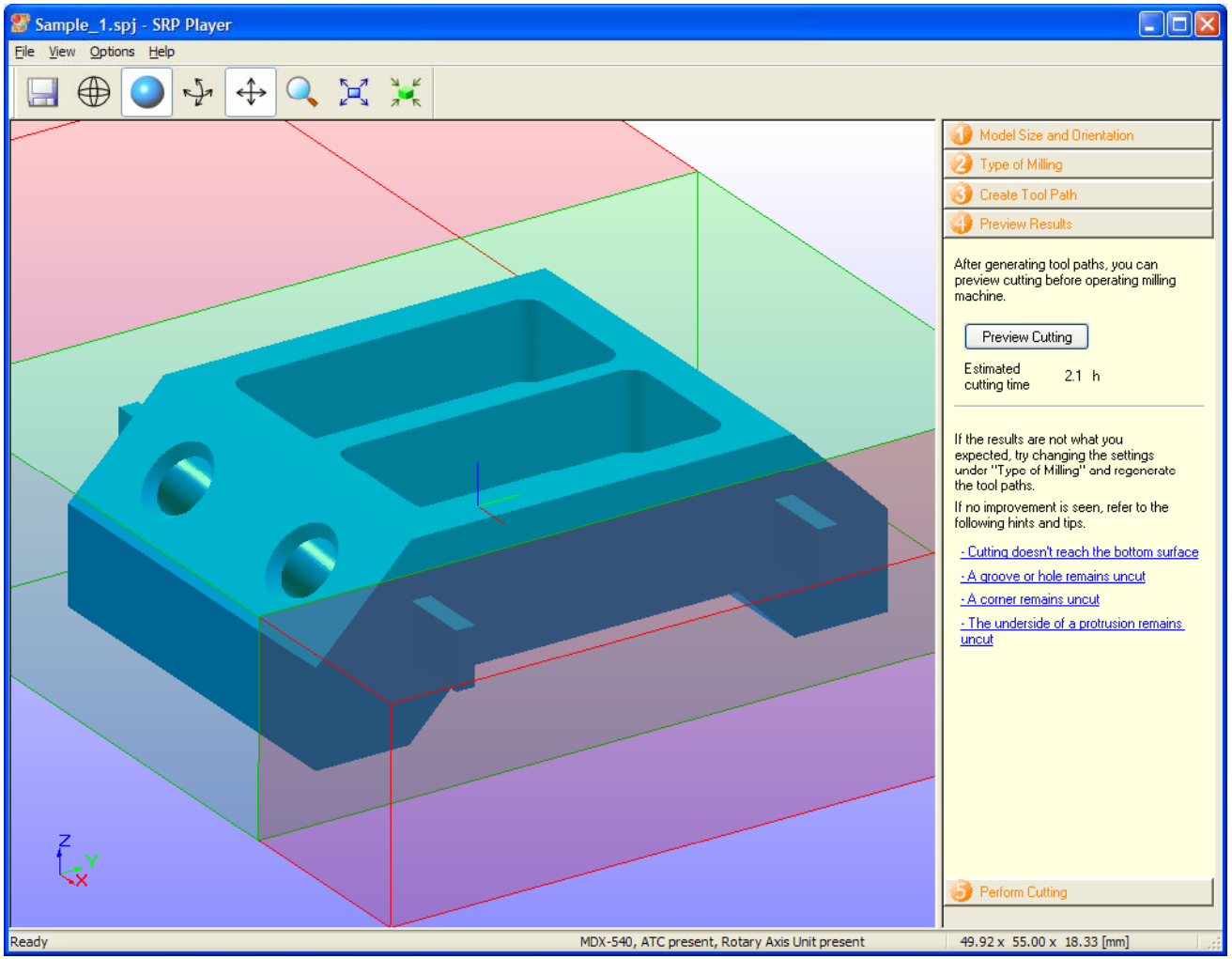


NOTES:

- Select material from pull down list.
- Enter material size.
  - Must be greater than values in parenthesis.
- Click Create Tool Path to process toolpath.
- Click on Step 4 when finished.

SRP Player

- Step 4

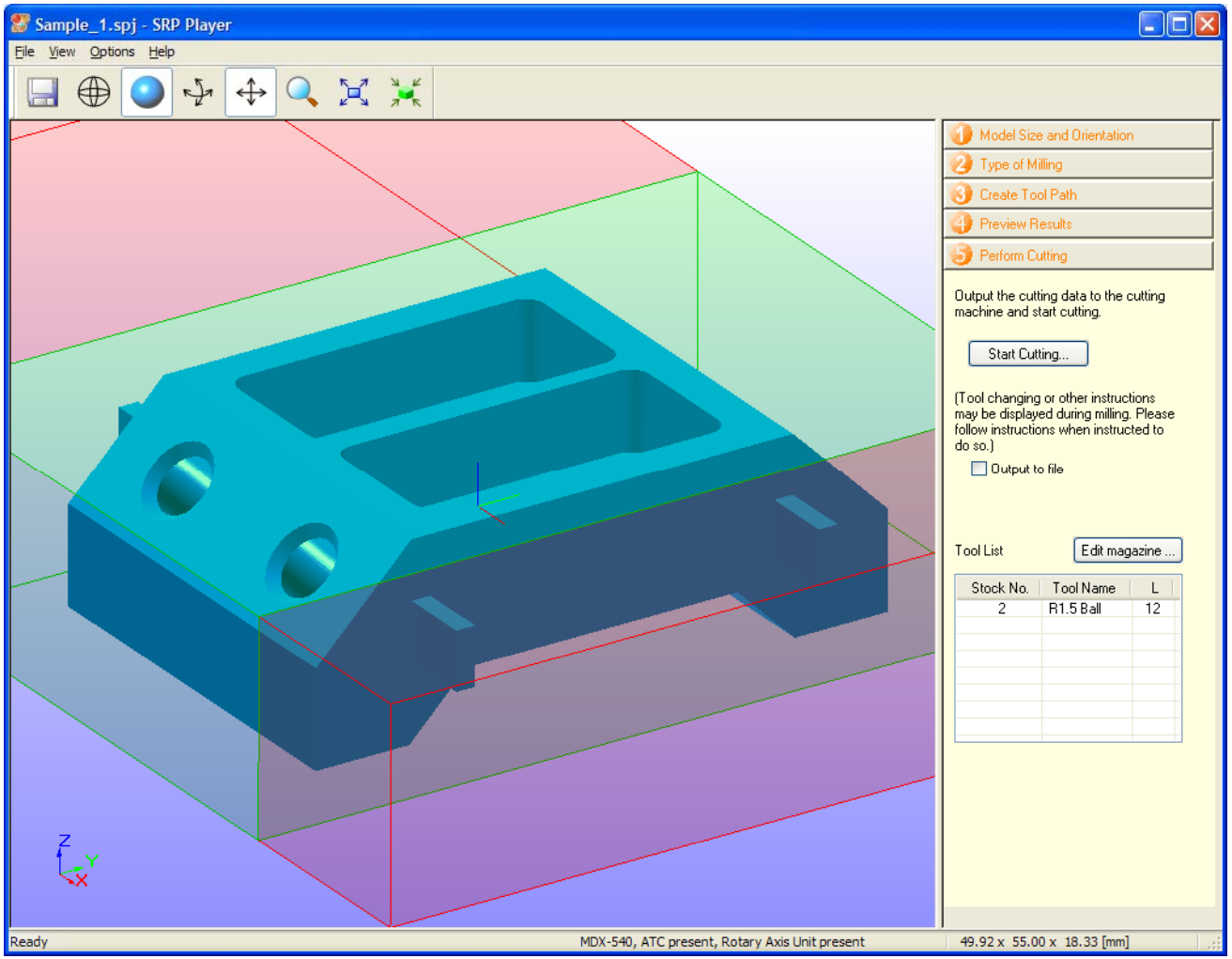


NOTES:

- You can view what the sample part will look like with selected tooling by clicking on Preview Cutting.
- You can view an estimated cutting time.
- Click on Step 5 when finished.

SRP Player

- Step 5

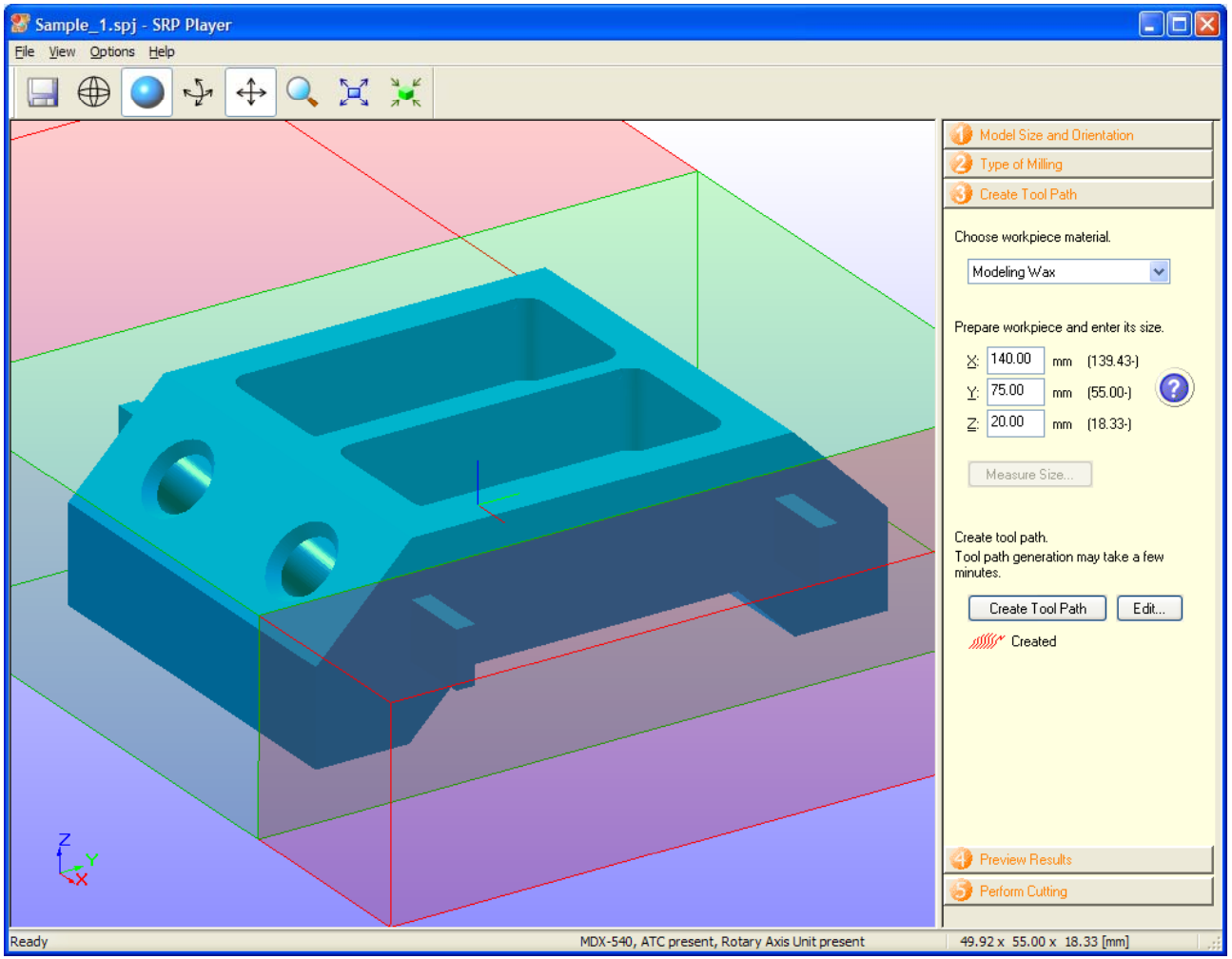


NOTES:

Click on Start Cutting to starting the cutting process.

SRP Player

- Back to Step 3

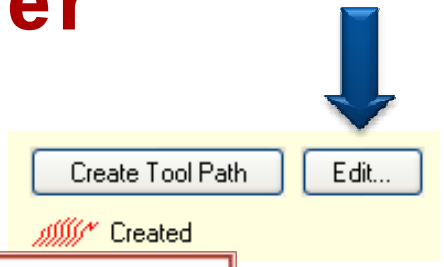


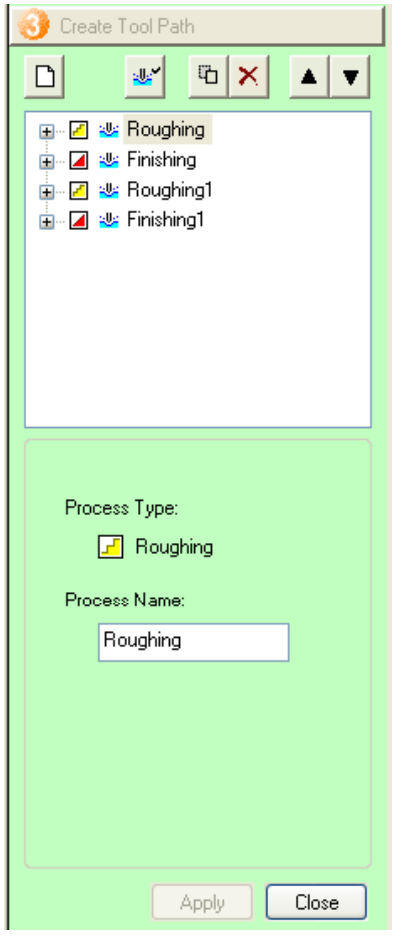
NOTES:

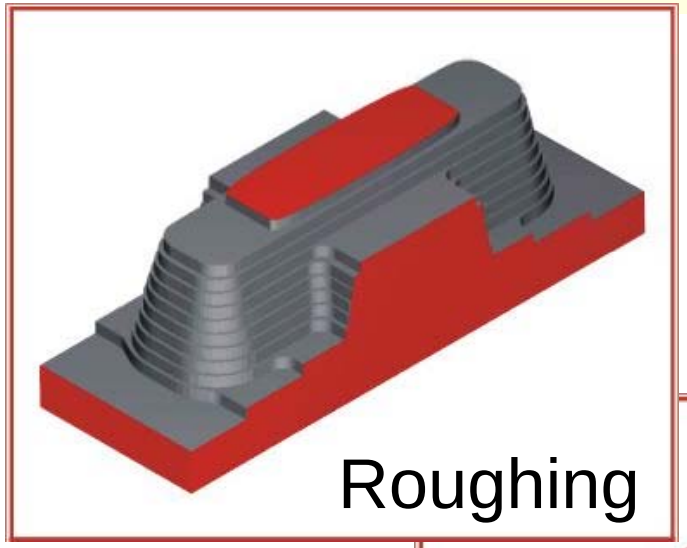
If you would like to make changes to your program, click on Step 3.

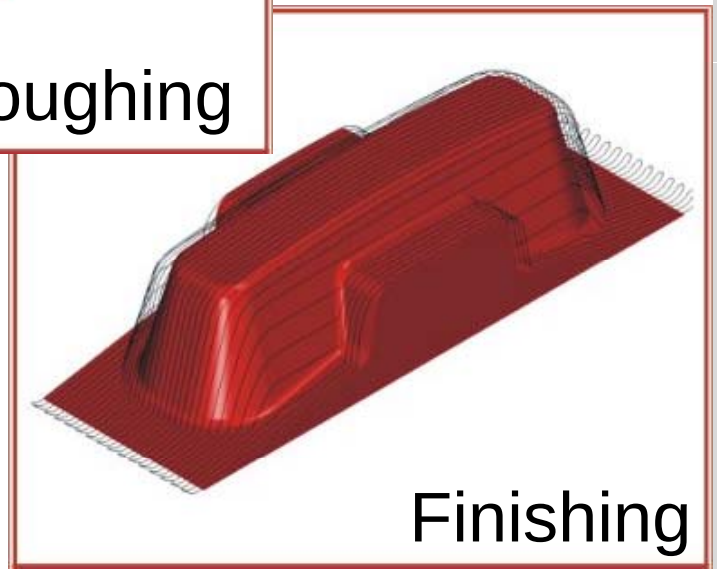
SRP Player

- Step 3 Modifications







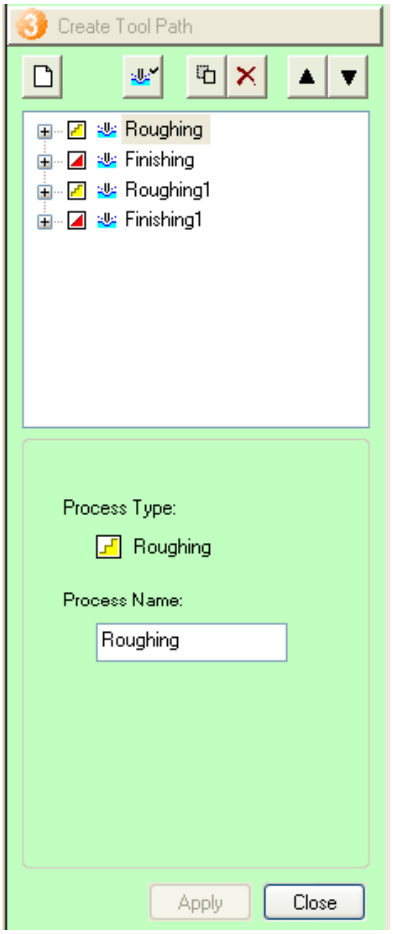


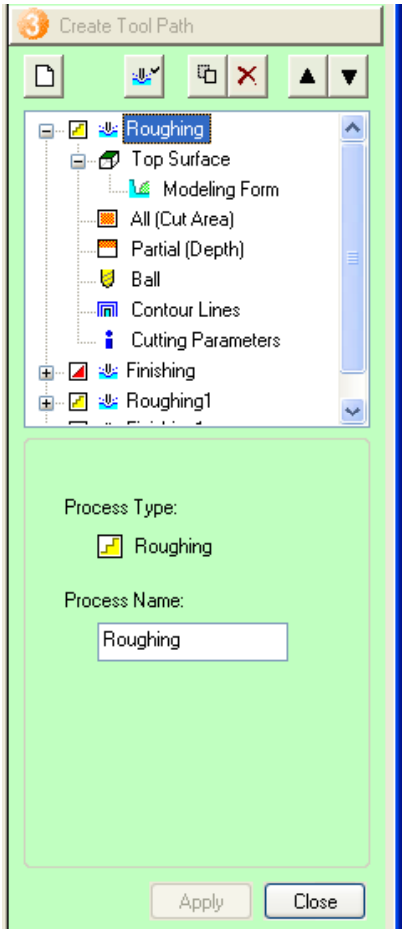
NOTES:

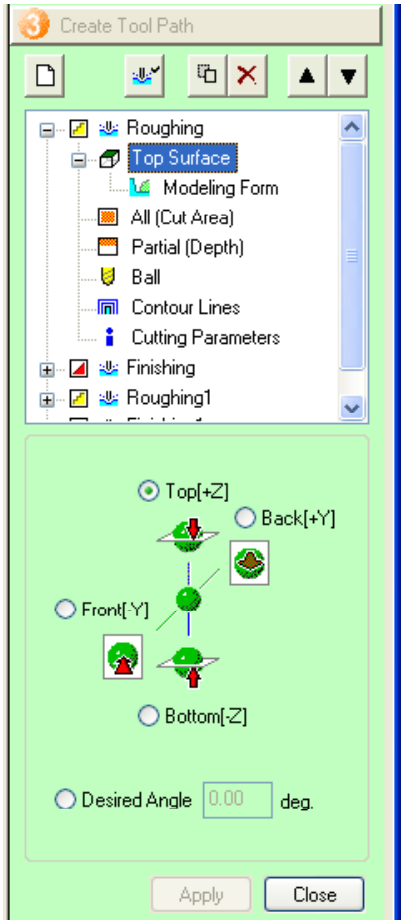
- Click on Edit.
- You can view and edit your processes as desired.
- **Roughing** process quickly removes material leaving a rough finish, usually with a larger tool.
- **Finishing** process cleans up the part to its final shape.

SRP Player

❖ Step 3 Modifications





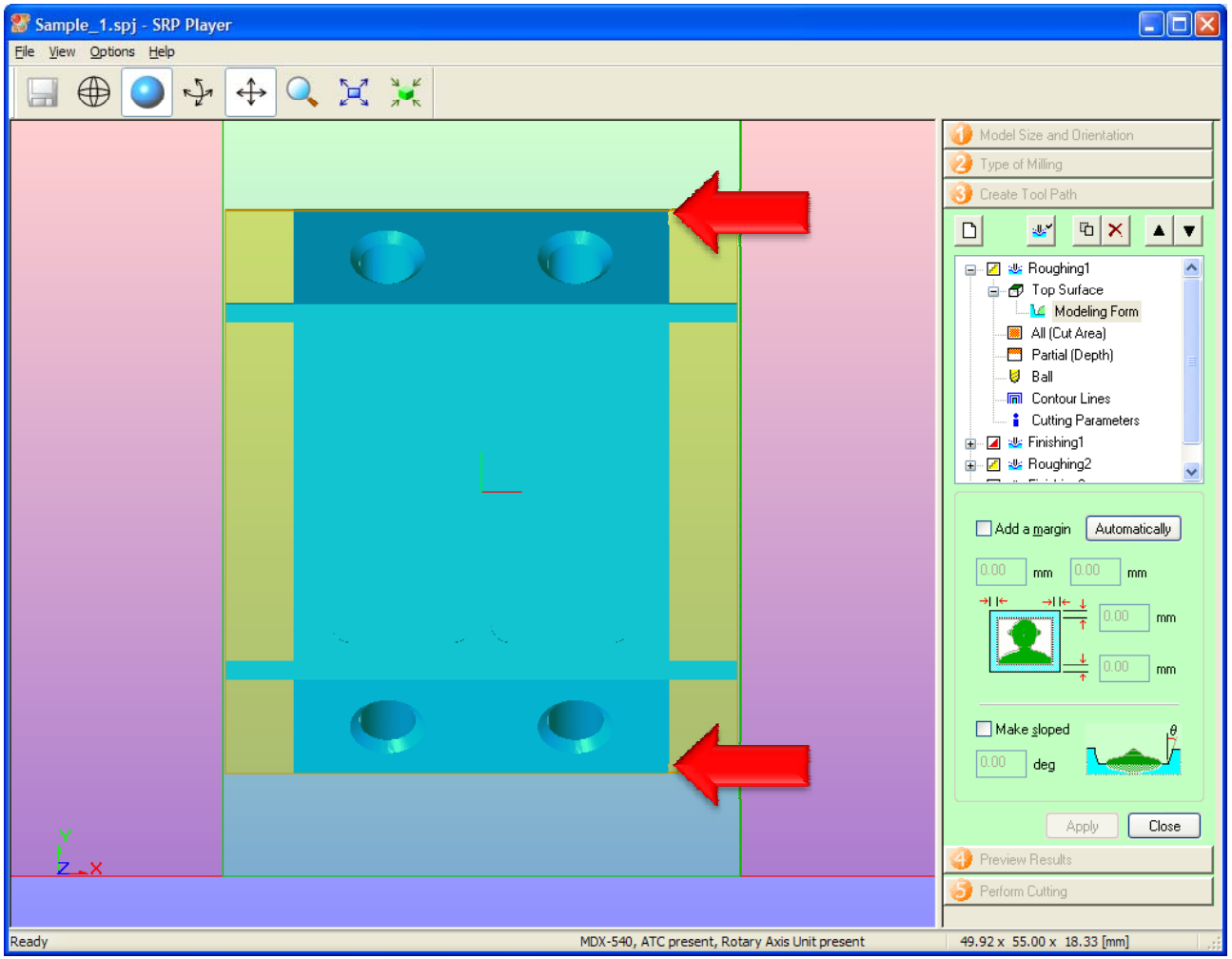


NOTES:

- Select Roughing process
- Select Top Surface and click on + to view options.
- You can rename the process
- You can change its orientation and angle if available.
- Click on Apply when finished.

SRP Player

- Step 3 Modifications

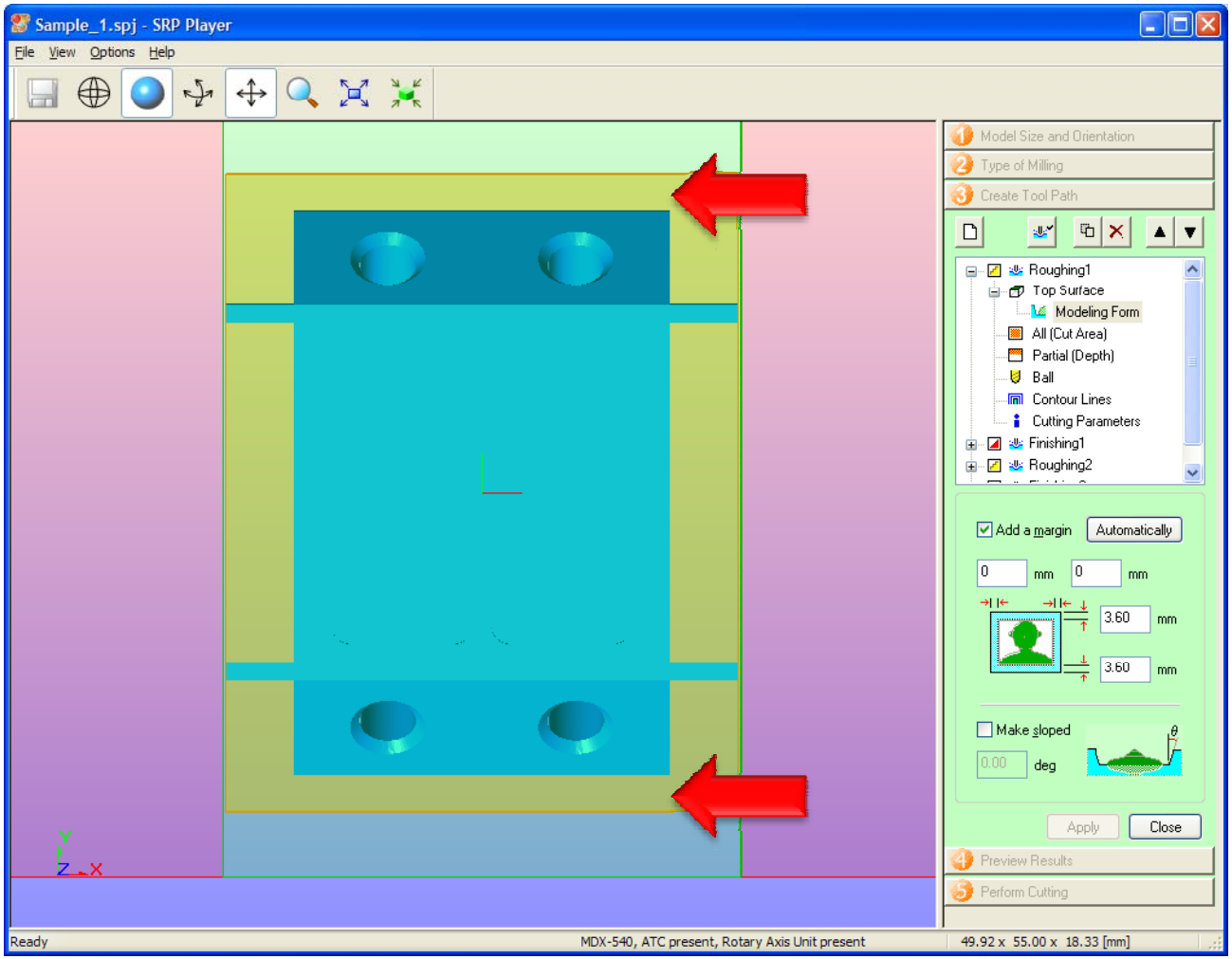


NOTES:

- Under Modeling Form, you can change the margins of the part.
- Click on Add a margin
- Click on Automatically
- You only need to add a margin above and below the part.
- You don't want to add a margin to the left or right.
- Once finished click Apply.

SRP Player

- Step 3 Modifications

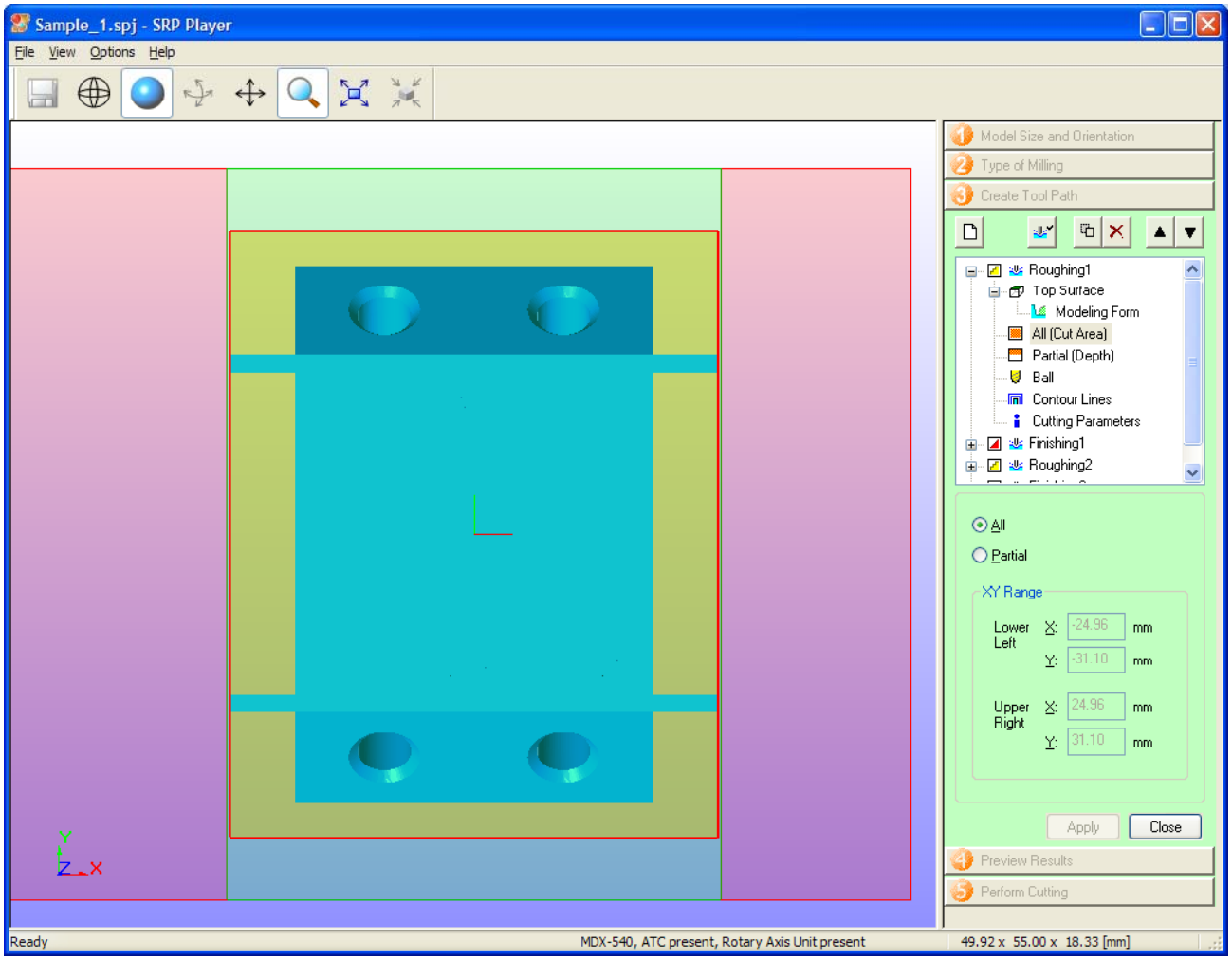


NOTES:

- Completed margin modifications.

SRP Player

- Step 3 Modifications

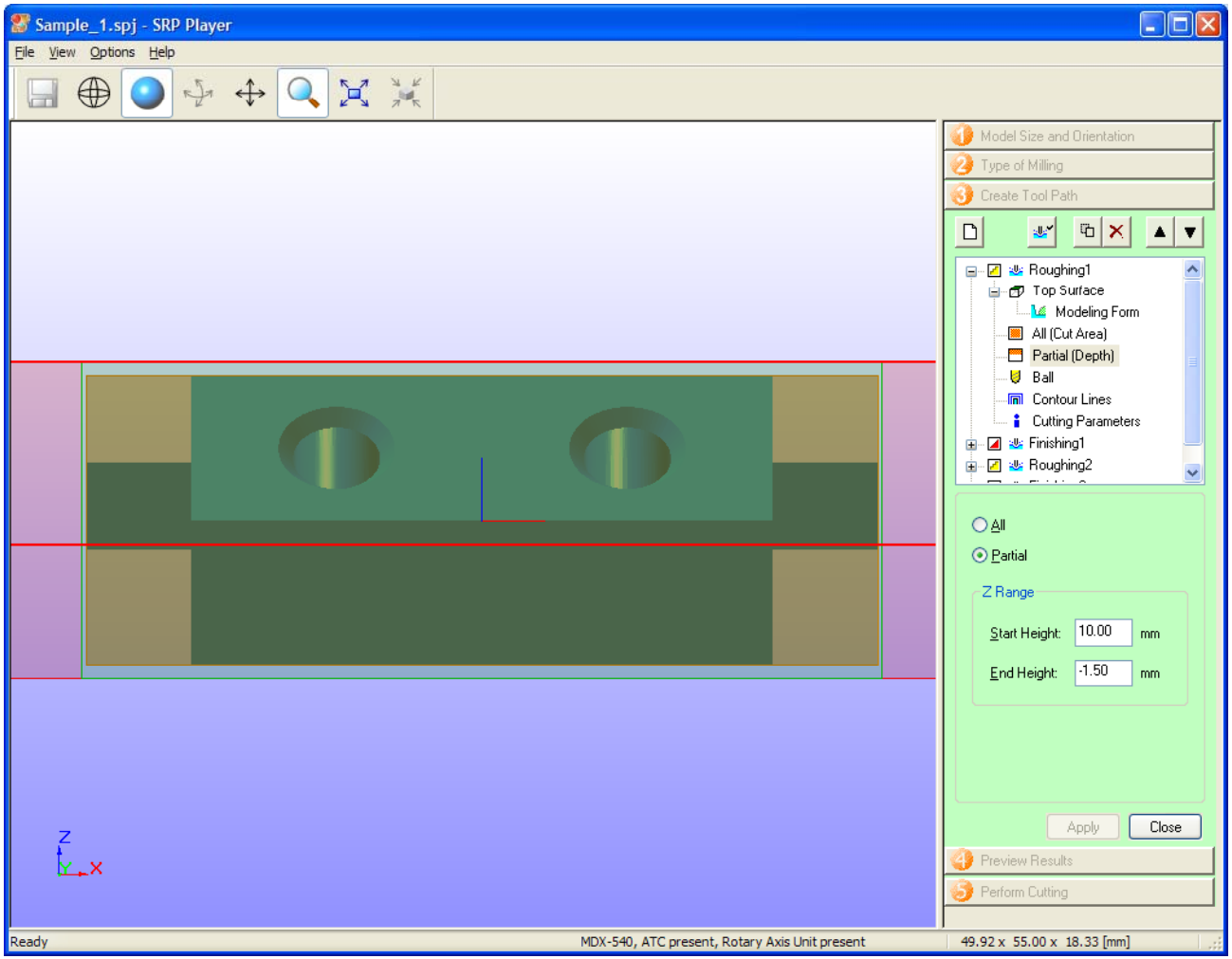


NOTES:

- You can modify the Cutting Area if desired by selecting Partial.
- You can enter values to specify the cutting area or drag the red box to the desired area.
- Click on Apply when finished.

SRP Player

- Step 3 Modifications

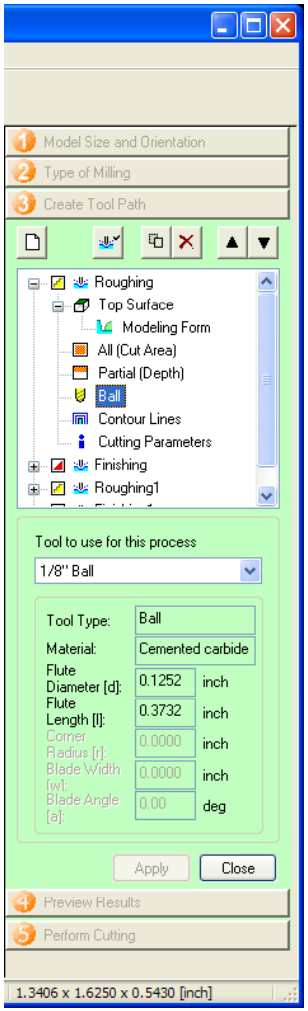


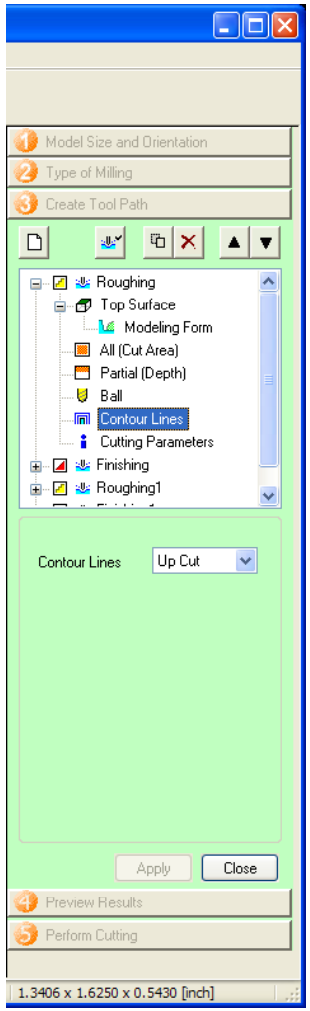
NOTES:

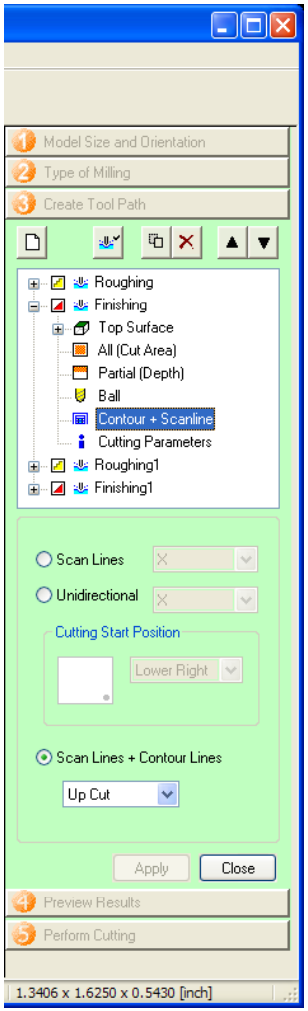
- The cutting depth can be modified by selecting Partial.
- Enter a value or drag the red line to the desired depth.
- Click on Apply when finished.

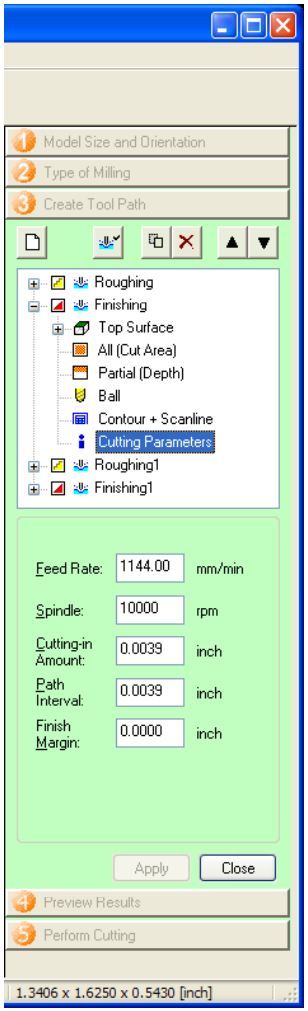
SRP Player

❖ Step 3 Modifications







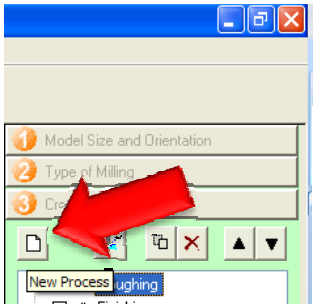


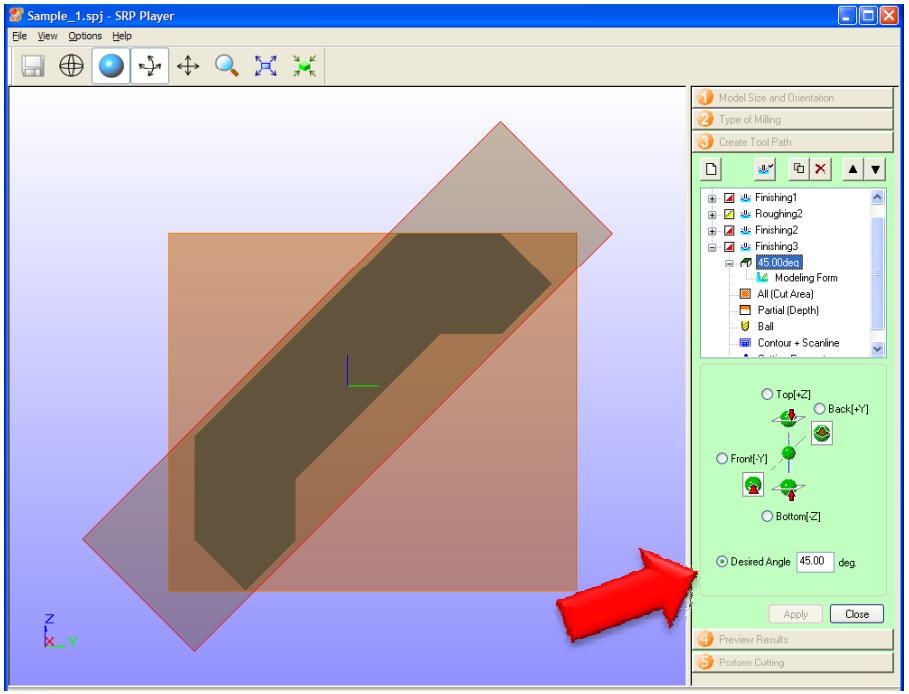
NOTES:

- You can select available Tool.
- You can modify available process to desired process if available.
- You can modify recommended feed rates if desired.
- Click on Apply when finished.
- Click on Close when all modifications have been completed.

SRP Player

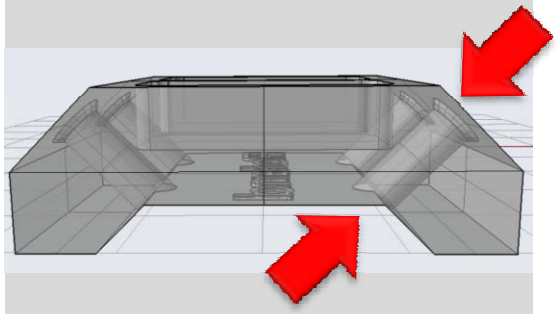
- Step 3 Advanced Modifications





NOTES:

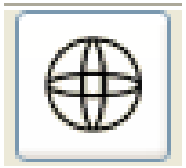
- Let's make some advanced modifications.
- The part in questions has some holes that can't be milled from the top or the bottom.



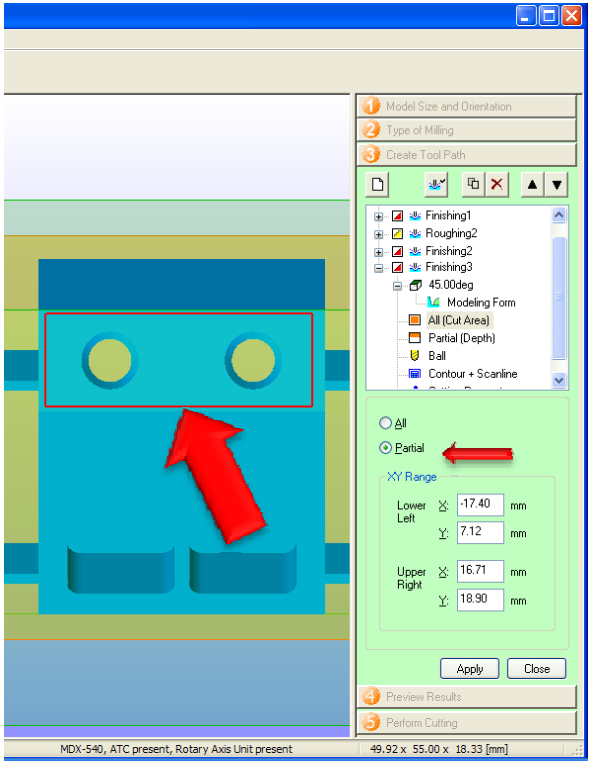
- We can turn the part at angle to mill the holes.
- We simply add a new process, usually finishing.
- Change the angle to 45 degrees and click apply to change the part.

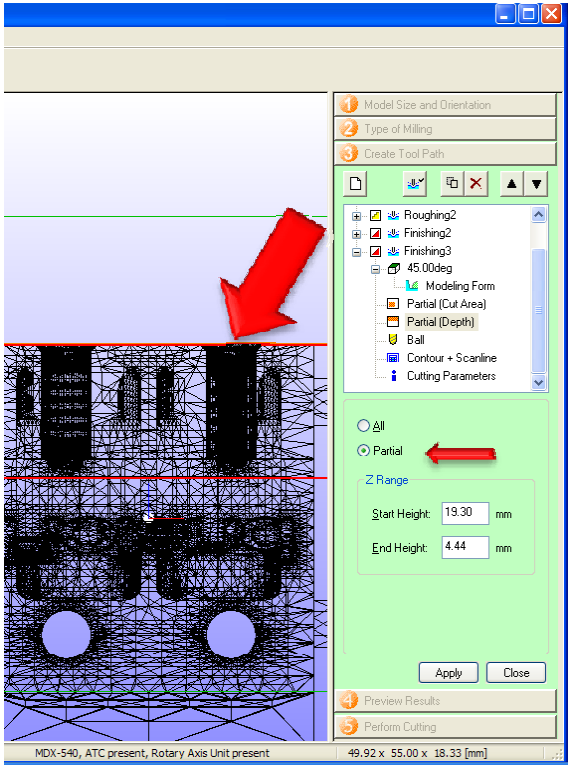
SRP Player

❖ Step 3 Advanced Modifications



Wireframe View





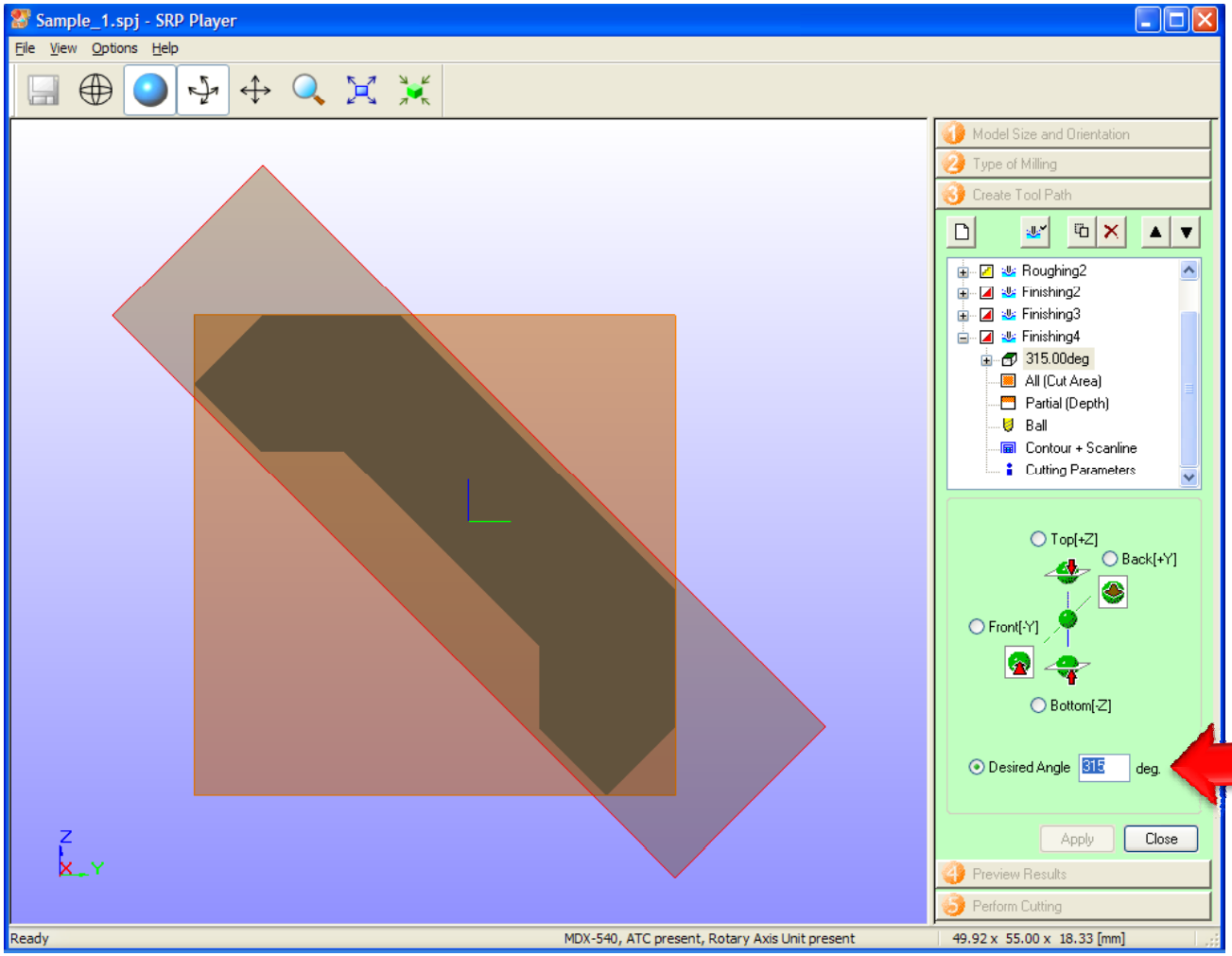
NOTES:

- As we only want to cut the holes, lets change the cutting area to cut only the holes.
- Click on Partial and simply drag the box to an area outside the tools.
- Click Apply when finished.

- For the depth, click on the start cutting line and bring it so that it is right below the depth of the hole.
- Bring the stop cutting line just below the holes so that the tool doesn't waste time cutting too deep.
- You may want to change the view to Wireframe view to view the holes better.
- Click Apply when finished.

SRP Player

- Step 3 Advanced Modifications

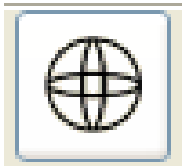


NOTES:

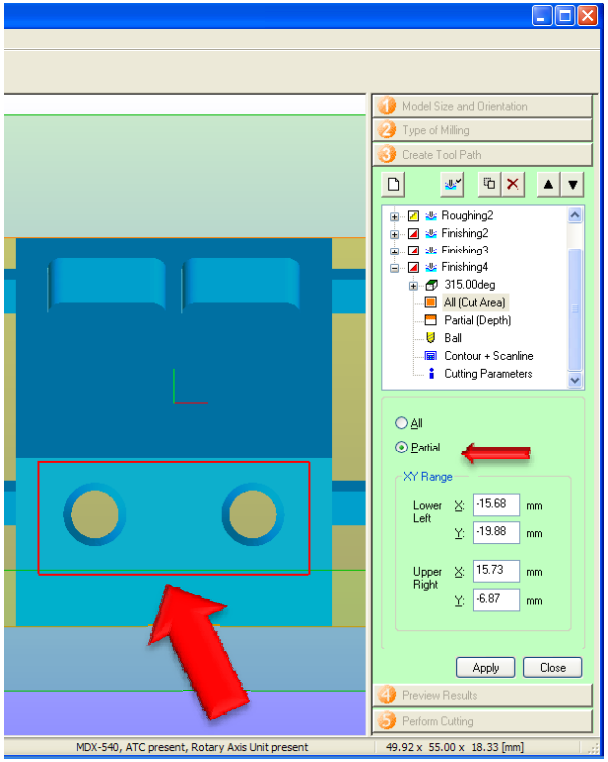
- To cut the other side, add another new finishing process.
- Change the angle to 315 degrees and click Apply.

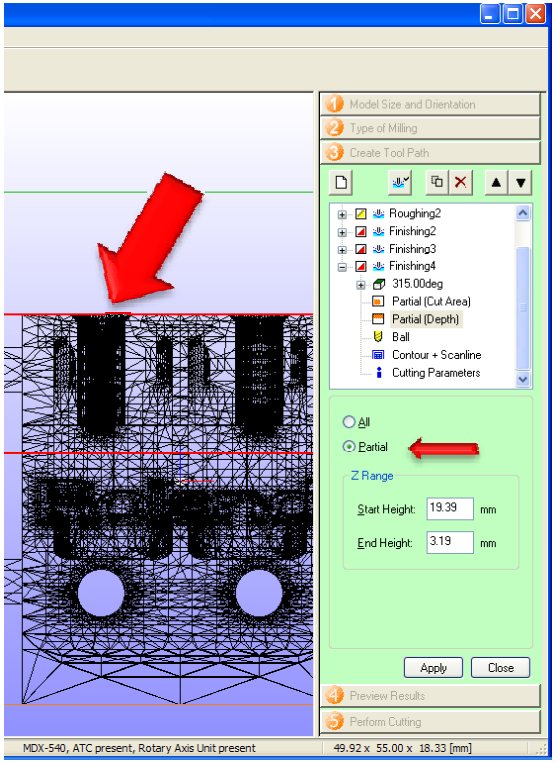
SRP Player

- Step 3 Advanced Modifications



Wireframe View





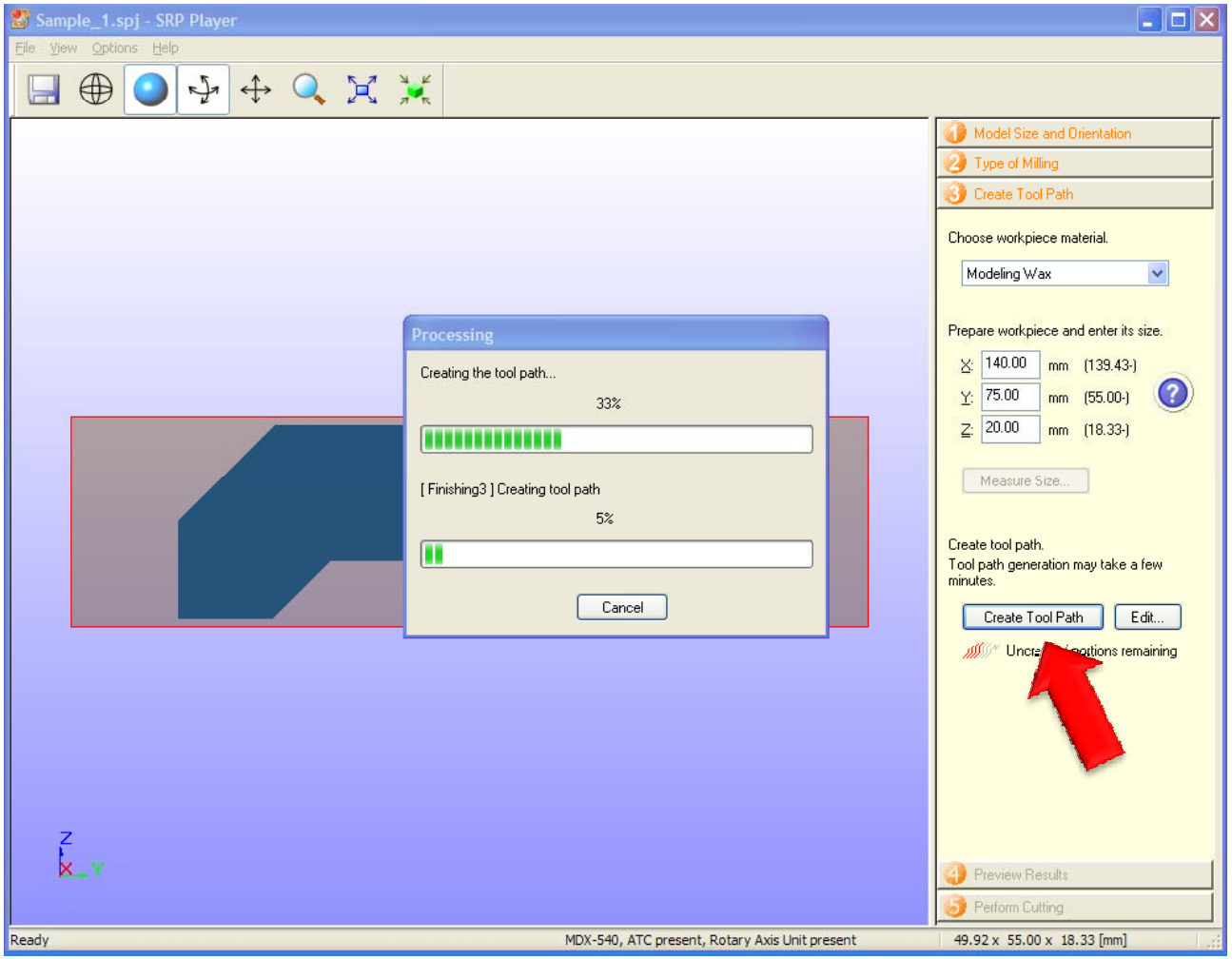
NOTES:

- Again, as we only want to cut the holes, lets change the cutting area to cut only the holes.
- Click on Partial and simply drag the box to an area outside the tools.
- Click Apply when finished.

- For the depth, click on the start cutting line and bring it so that it is right below the depth of the hole.
- Bring the stop cutting line just below the holes so that the tool doesn't waste time cutting too deep.
- You may want to change the view to Wireframe view to view the holes better.
- Click Apply when finished.
- Click Close when finished editing.

SRP Player

- Step 3 Advanced Modifications

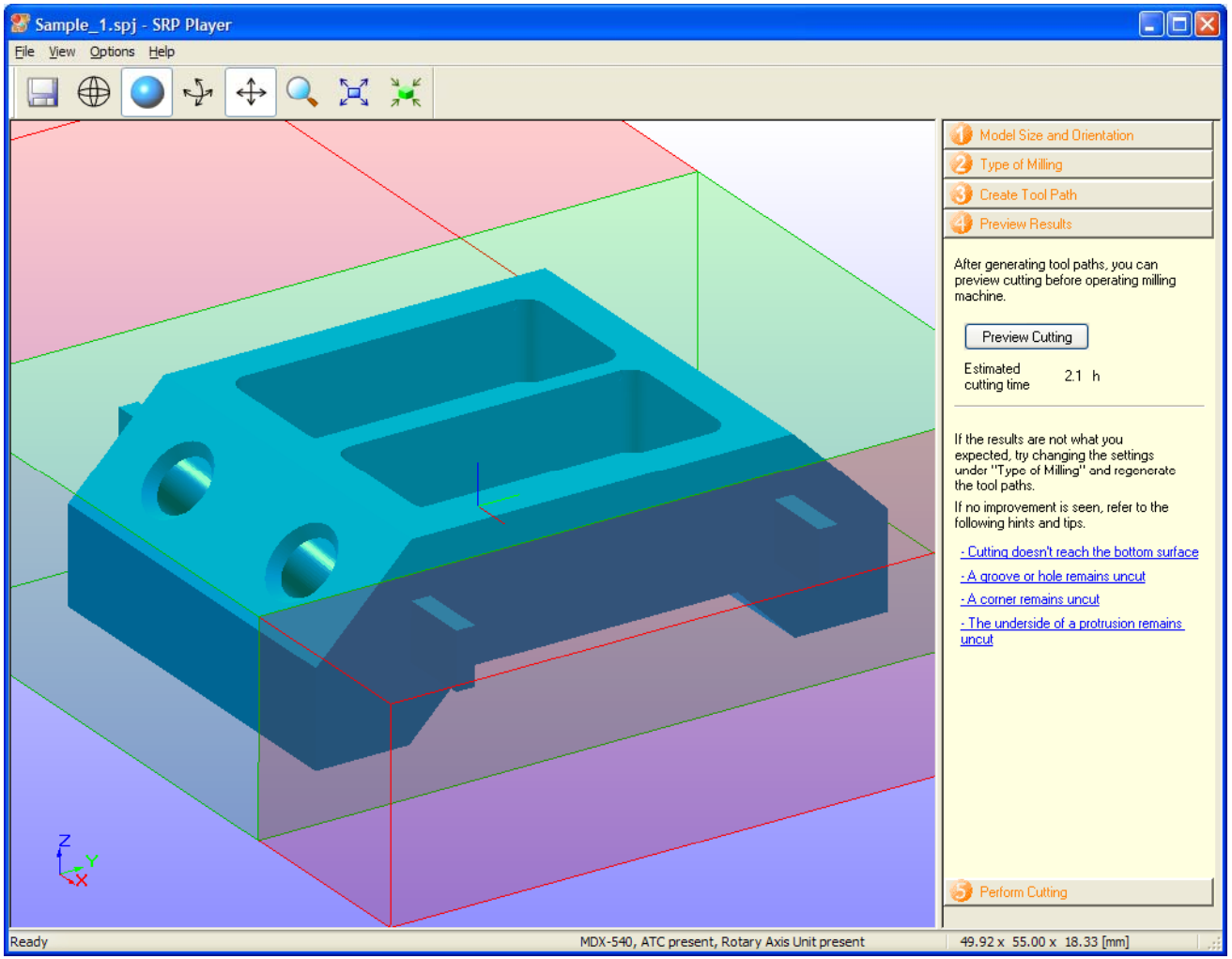


NOTES:

- Click on Create Tool Path to generate the tool path.
- Click on Step 4 when finished.

SRP Player

- Step 4

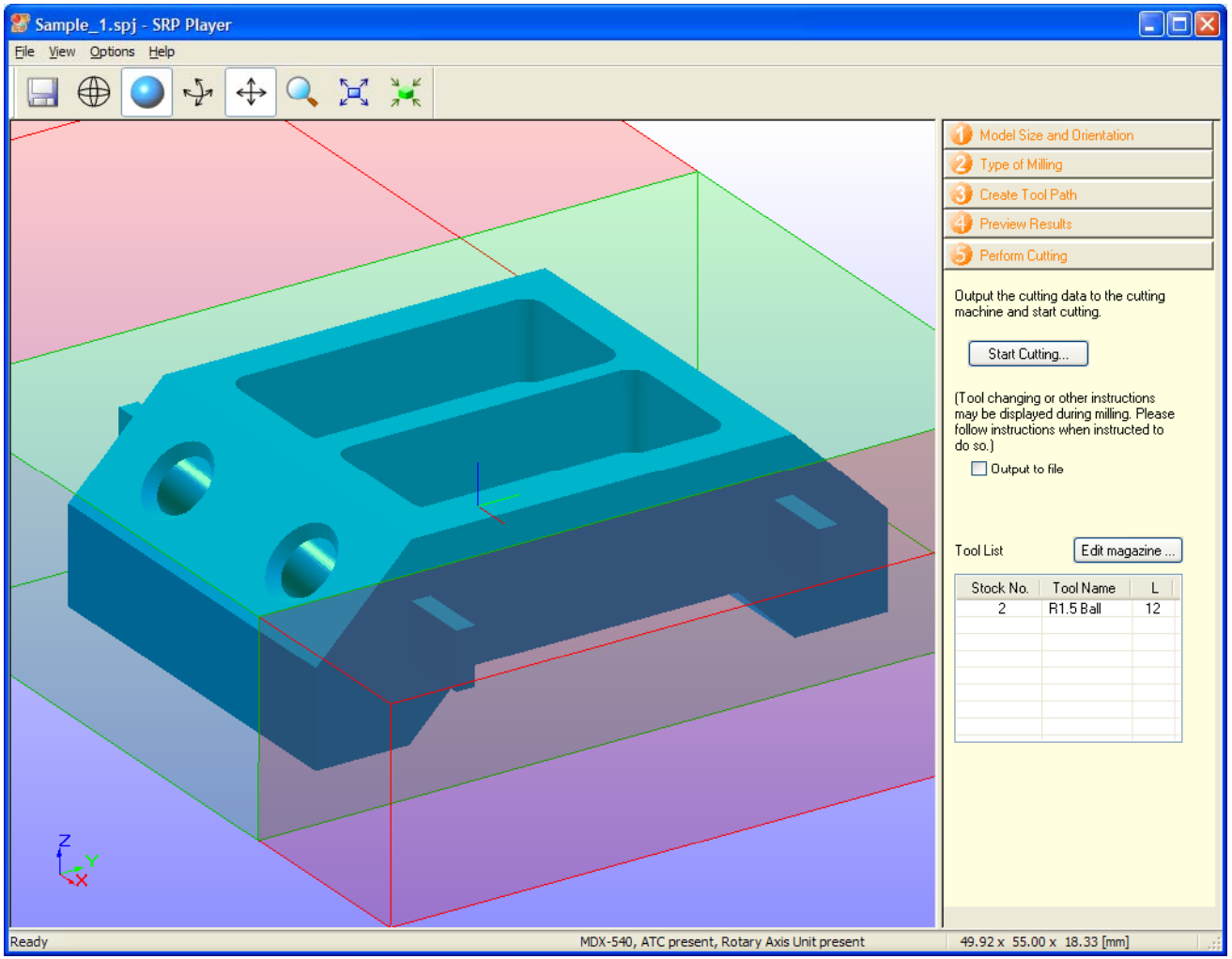


NOTES:

- You can view what the sample part will look like with selected tooling by clicking on Preview Cutting.
- You can view an estimated cutting time.
- Click on Step 5 when finished.

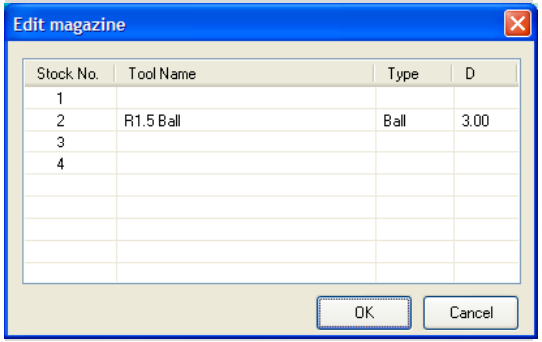
SRP Player

- Step 5

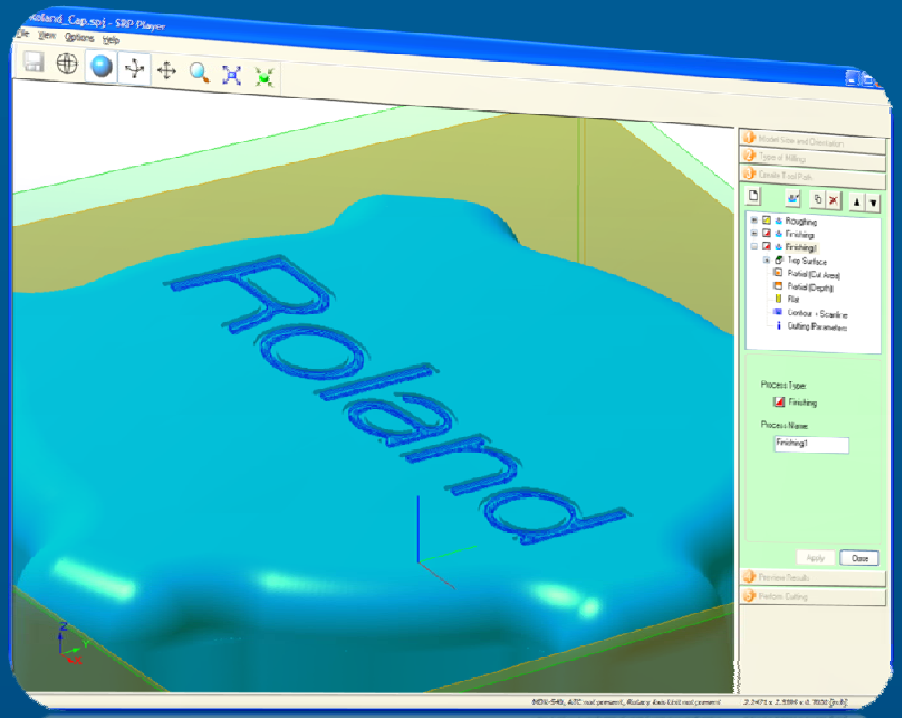


NOTES:

- If you have an Automatic Tool Changer, you can Edit Magazine to specify tool location.



- Click on Start Cutting to starting the cutting process.

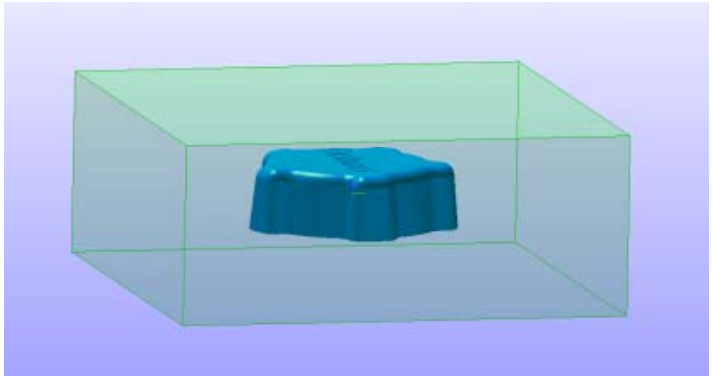


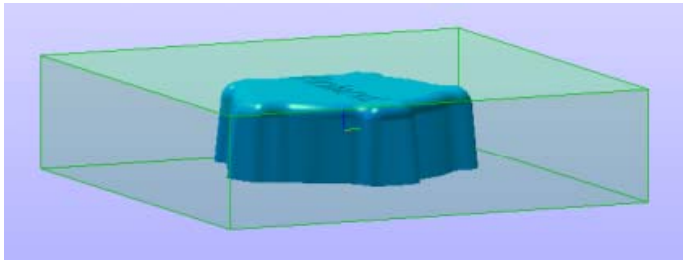
SRP Player Tips

SRP Player Tips

Material Tips

- The complexity of a part, its size, and the material being cut will dictate how long it will take to cut on a machine. Here are some tips to keep in mind while setting up a part to cut on your machine.
- If your part is small, and your material thick, then this will add to the process time.
- You want to try and keep your material as close to the part size as possible.



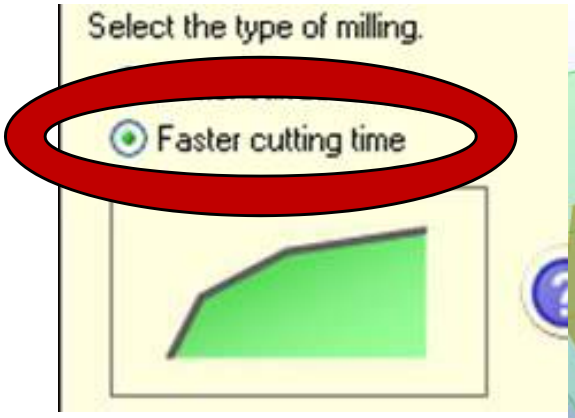


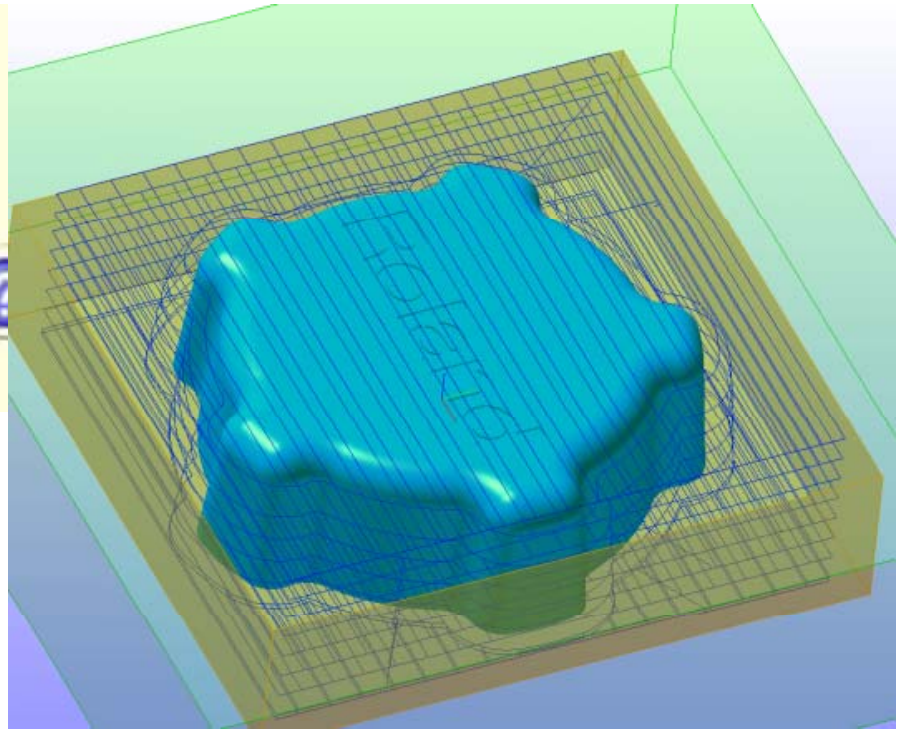
NOTES:

SRP Player Tips

Cutting Speed vs. Quality

- The selection of your tool will also make a big difference in time. If you select faster cutting time…
- …it will select the largest tool you have and cut faster



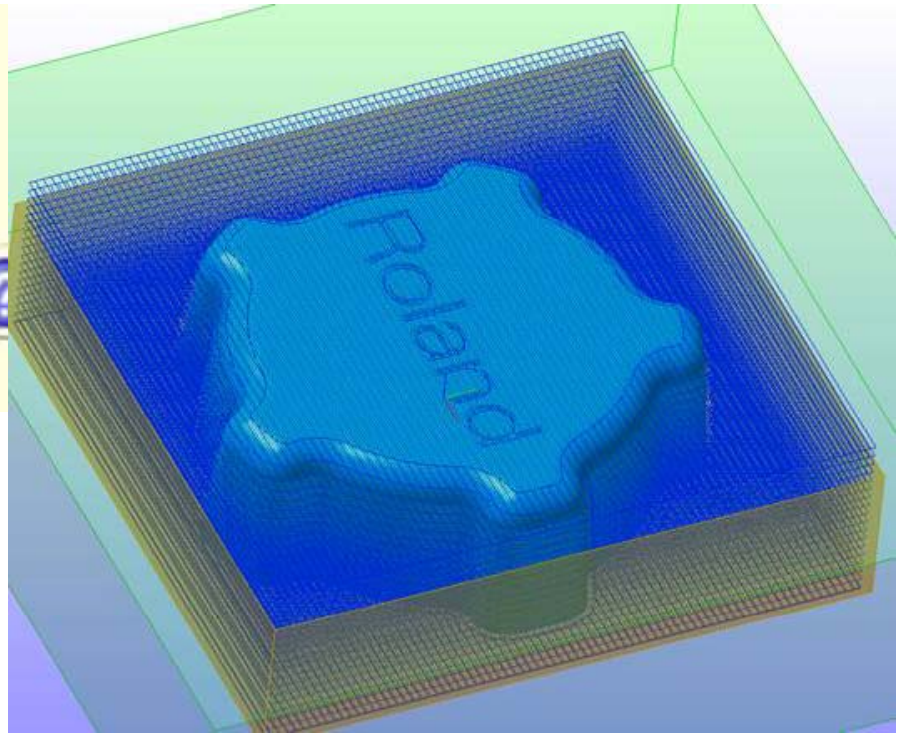


NOTES:

SRP Player Tips

Cutting Speed vs. Quality Cont.

- If you select better surface finish, then it will select a much smaller tool.
- When a smaller tool is selected, it will need more passes to remove the material. All the additional lines seen in the below picture translate to longer milling times.



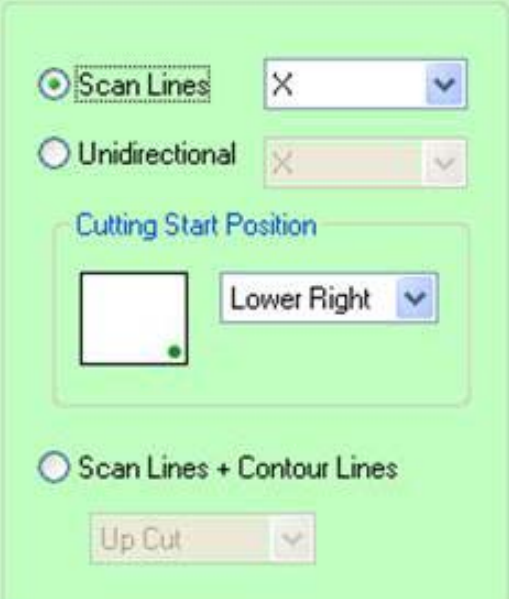
NOTES:

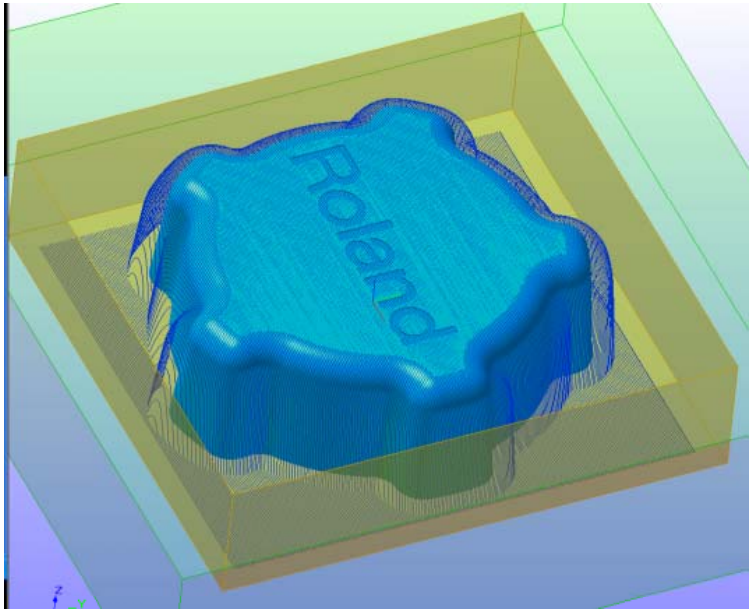
SRP Player Tips

Cutting Speed vs. Quality Cont.

- The best thing to do is select as big a tool as you can. If you need more detail, then select a smaller tool on the finishing portion of the program.

- To speed the process up even more, change the finishing tool path to “Scan Lines” instead of “Contour Lines”.



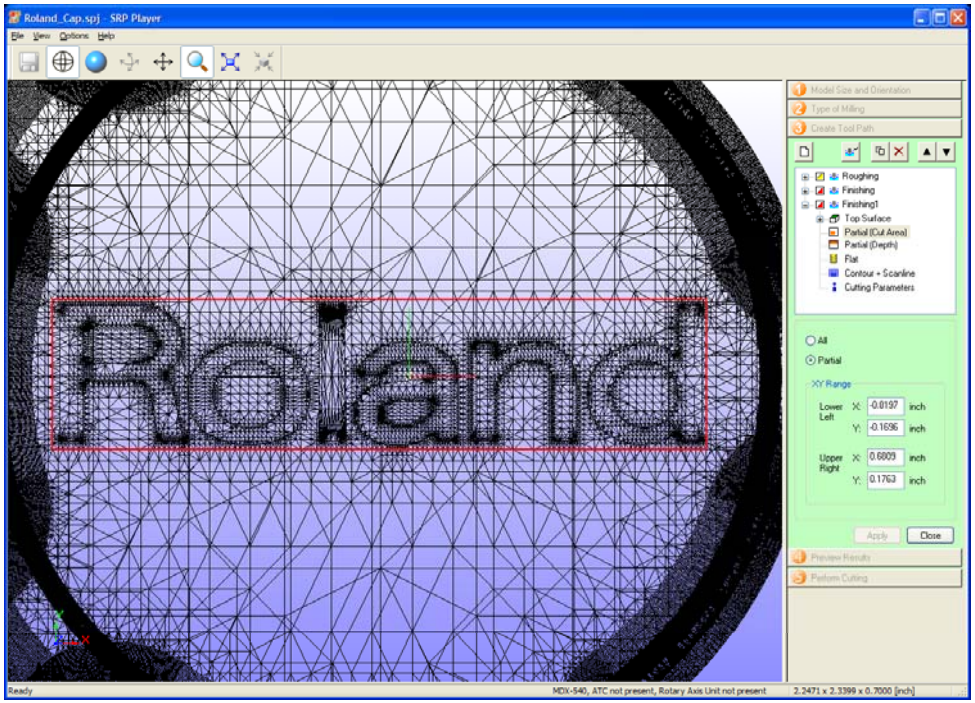


NOTES:

SRP Player Tips

Small Features

- If you have small letters or small features in the part, cut the rest of the part with a larger tool and use a smaller tool just for the letters/features.
- Start by adding a finishing tool path. Set the cut area only around the letters by dragging the red box around the details.
- Next, select a tool that will fit in the letters/features.

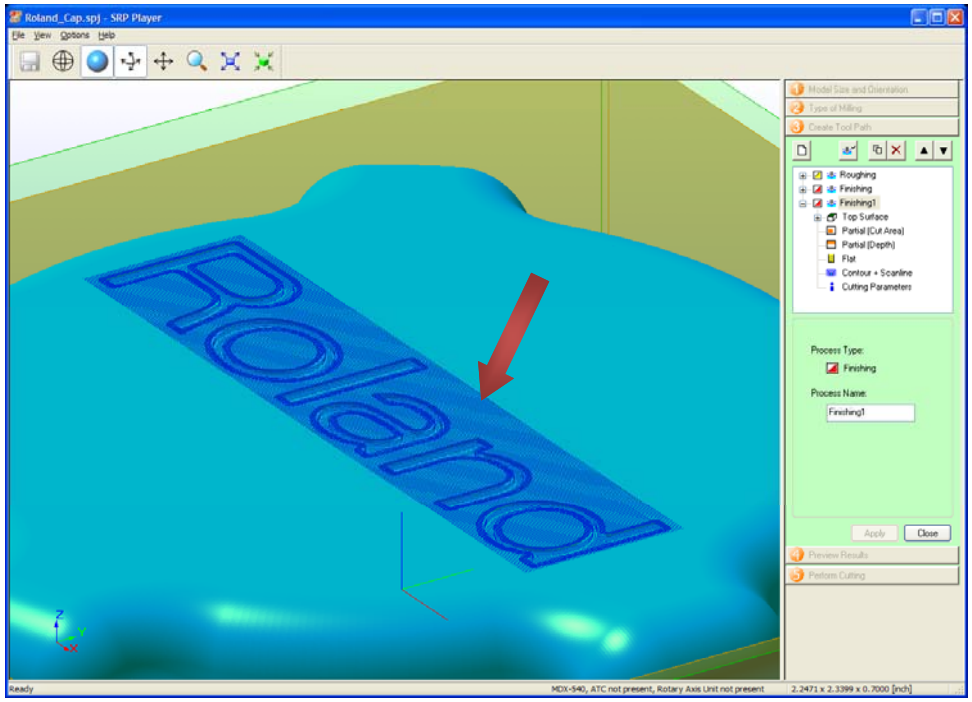


NOTES:

SRP Player Tips

❖ Small Features Cont.

- ❖ To avoid the additional surface lines shown in the below image…

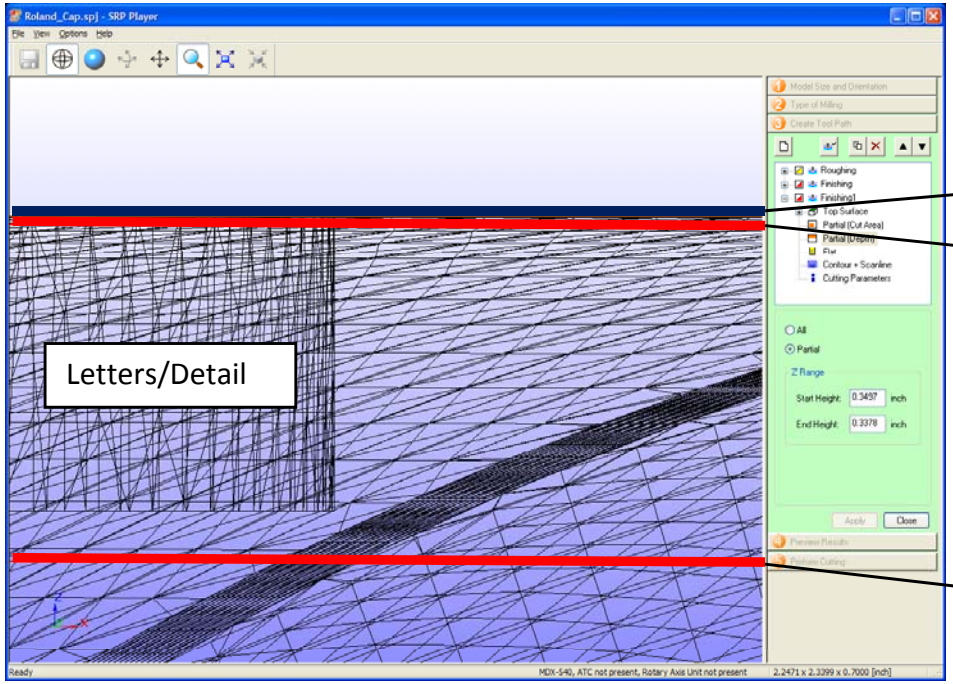


NOTES:

SRP Player Tips

Small Features Cont.

- …set the start height so that it is just below the surface of the part. Usually about 0.001” to 0.002” below the surface of the material works great.



Letters/Detail

Part Surface

Start Height

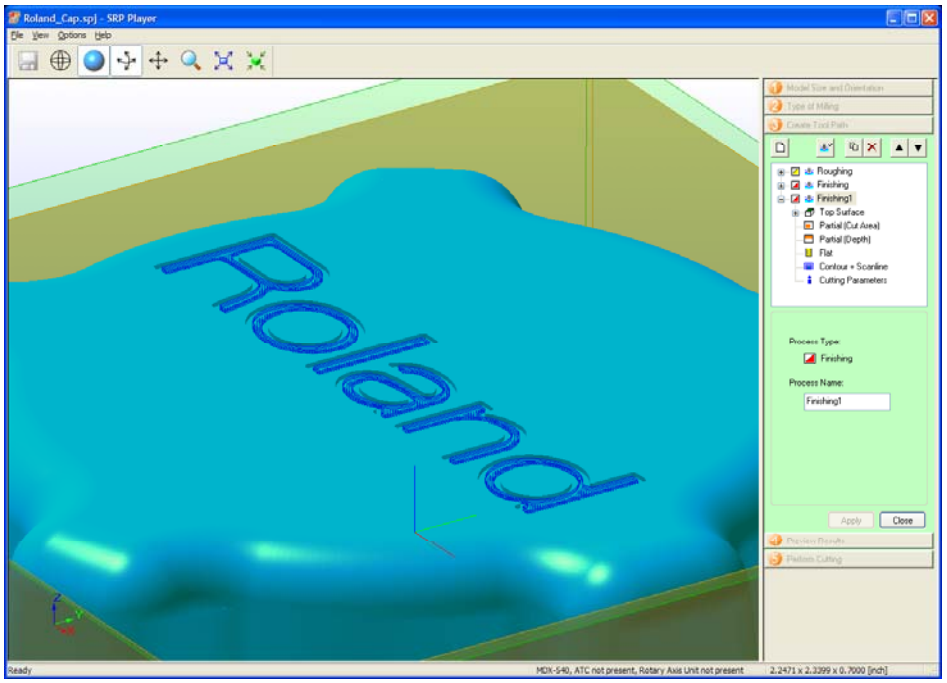
End Height

NOTES:

SRP Player Tips

❖ Small Features Cont.

- This will allow you to cut only the letters/details required and not waste any additional time.

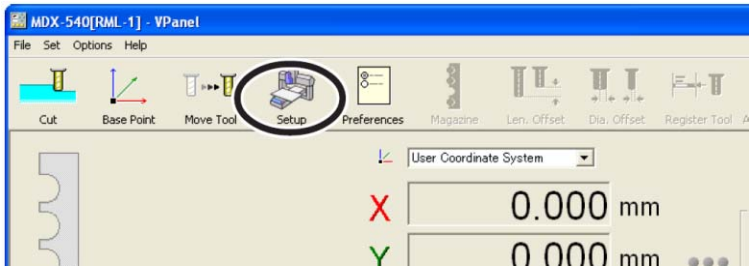


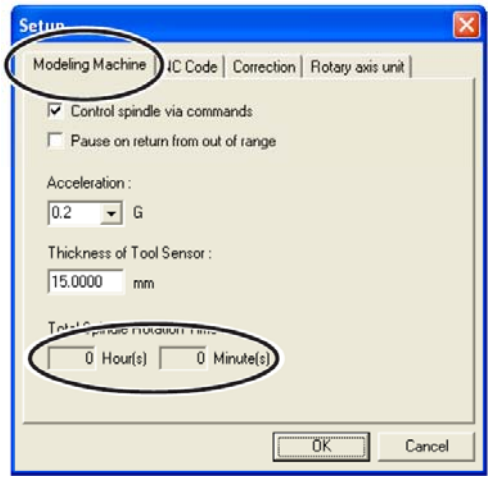
NOTES:

MDX-540 Maintenance

Maintenance

- Recommended Maintenance Items
  - Daily
    - Remove chips and dust
  - 1,000 hours
    - Lubricate Ball Screws
  - 2,000 hours
    - Replace spindle bearings (ATC Spindle needs to be replaced after 5,000 hours)
    - Spindle Belt (1000002084)
- Hour check





NOTES:

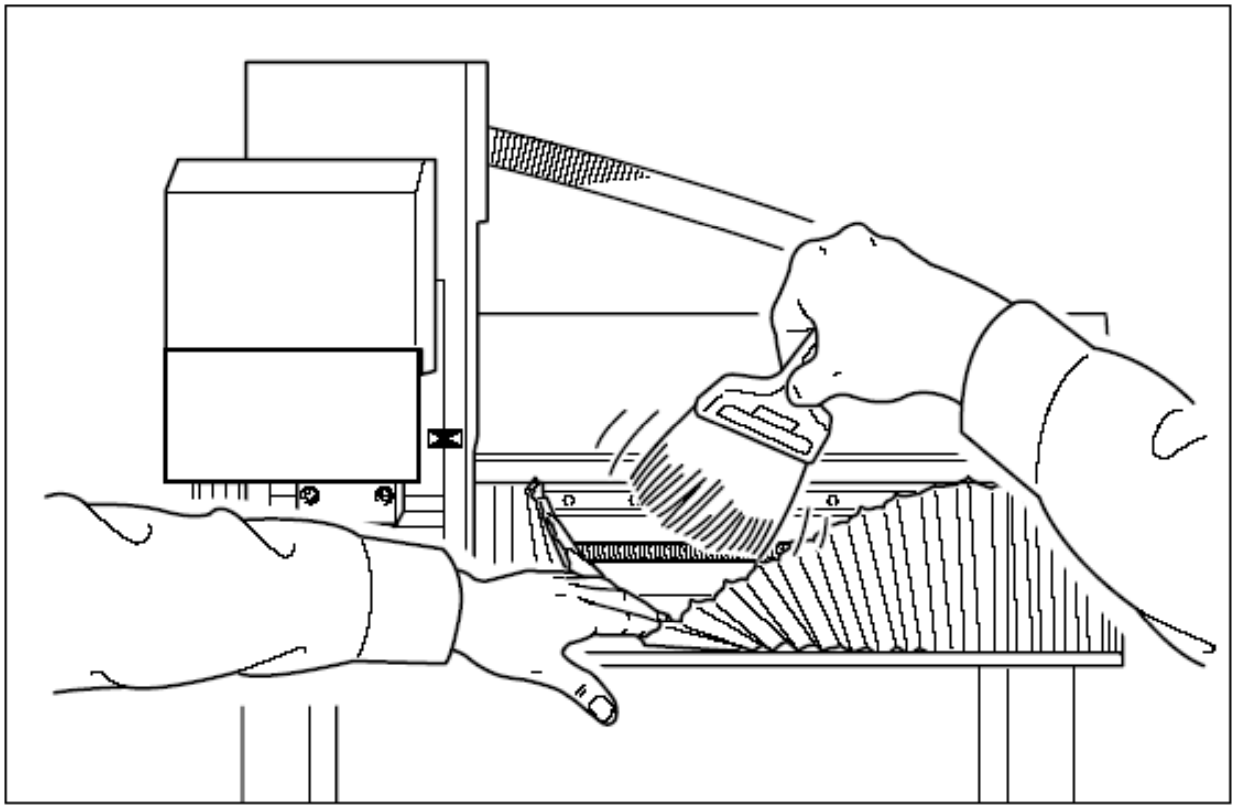
Maintenance

- Daily Cleaning
  - Use inexpensive paint brush
  - Wipe away visible chips & dust
  - Vacuum away all remaining chips
    - Wet dry vac works great

NOTES:

Maintenance

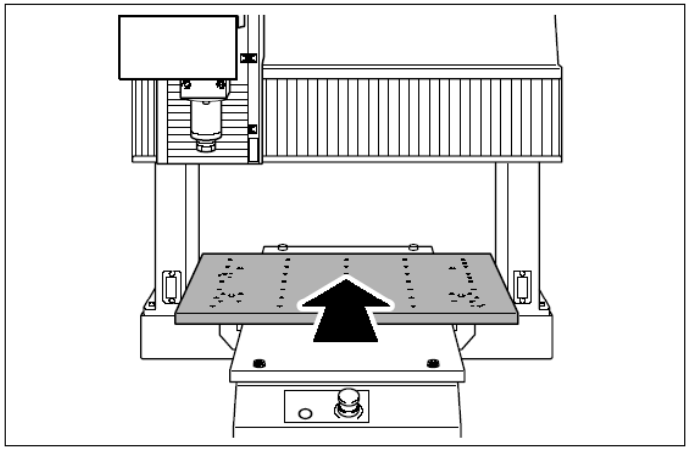
- Cleaning X Axis

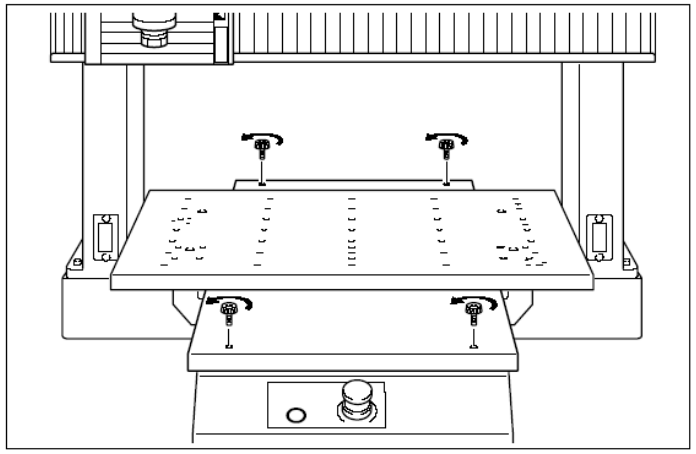


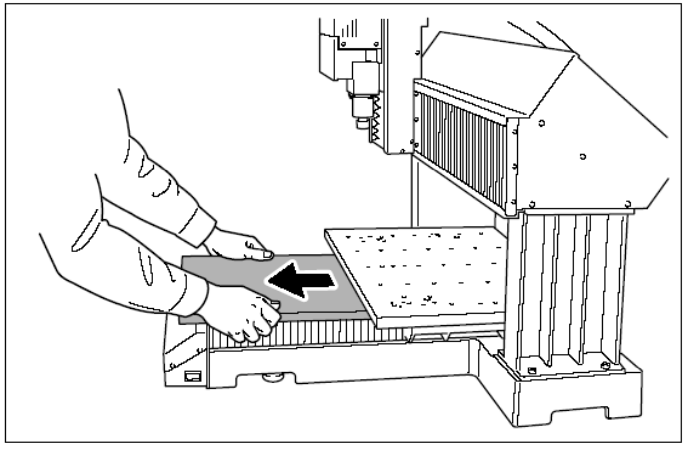
NOTES:

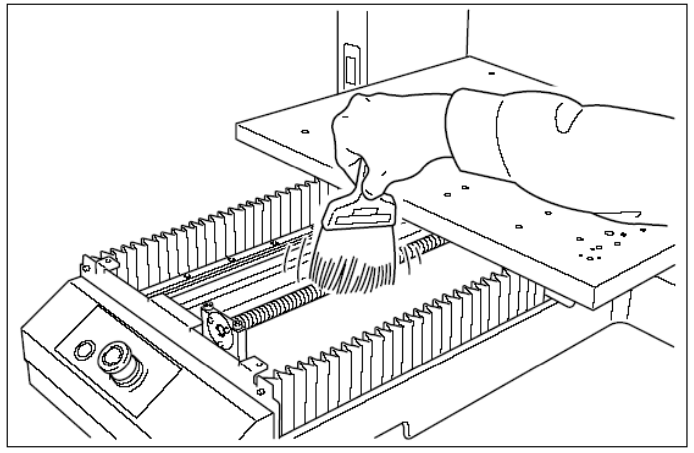
Maintenance

- Cleaning Y Axis





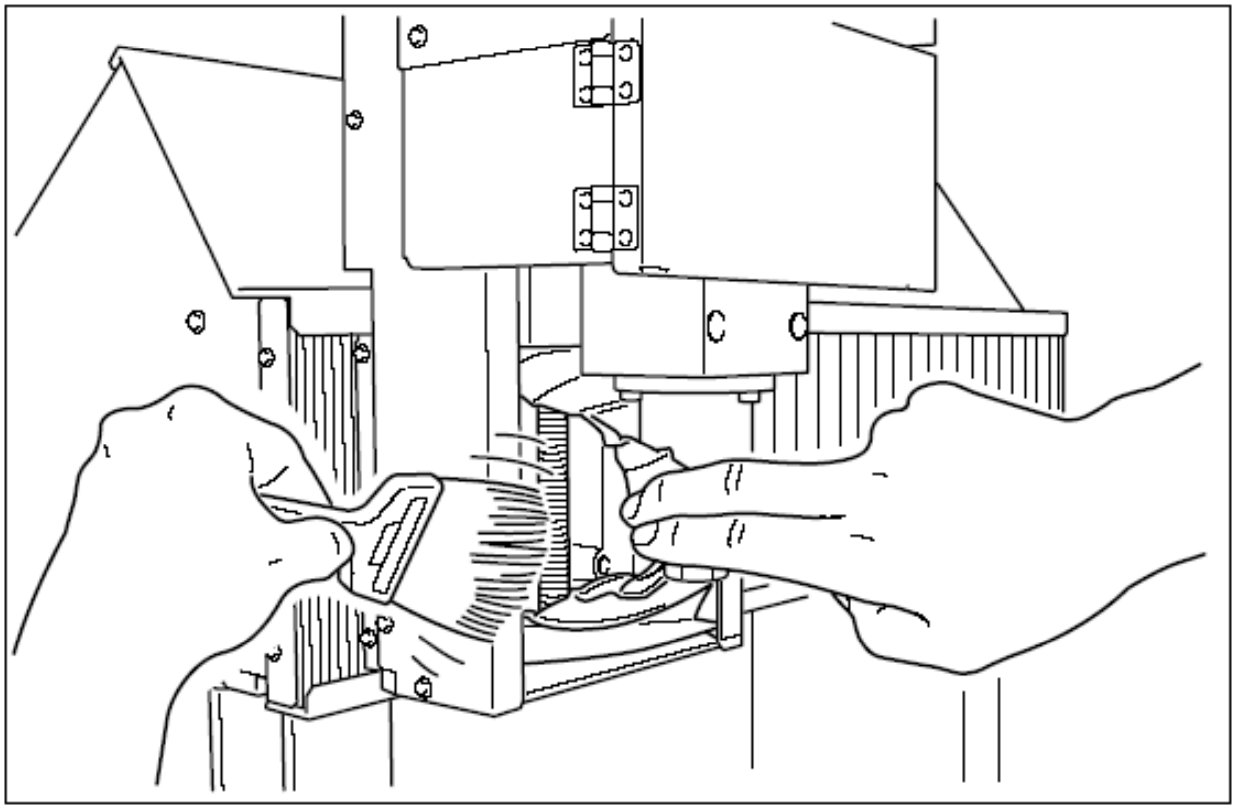




NOTES:

Maintenance

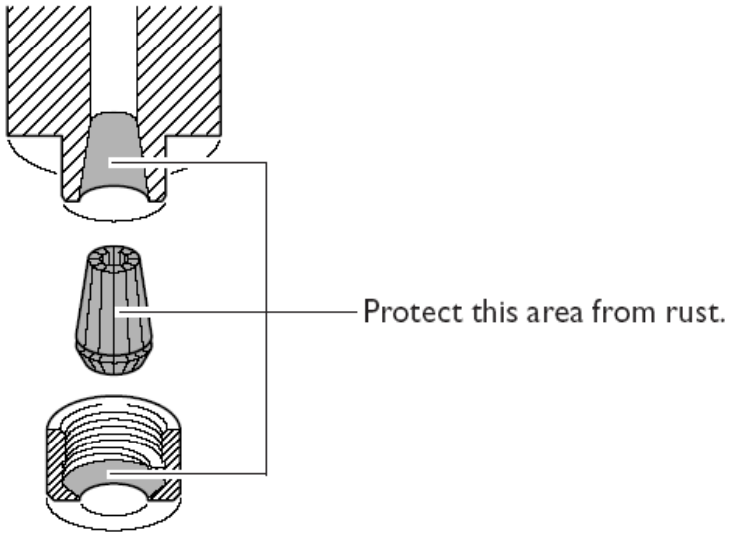
- Cleaning Z Axis



NOTES:

Maintenance

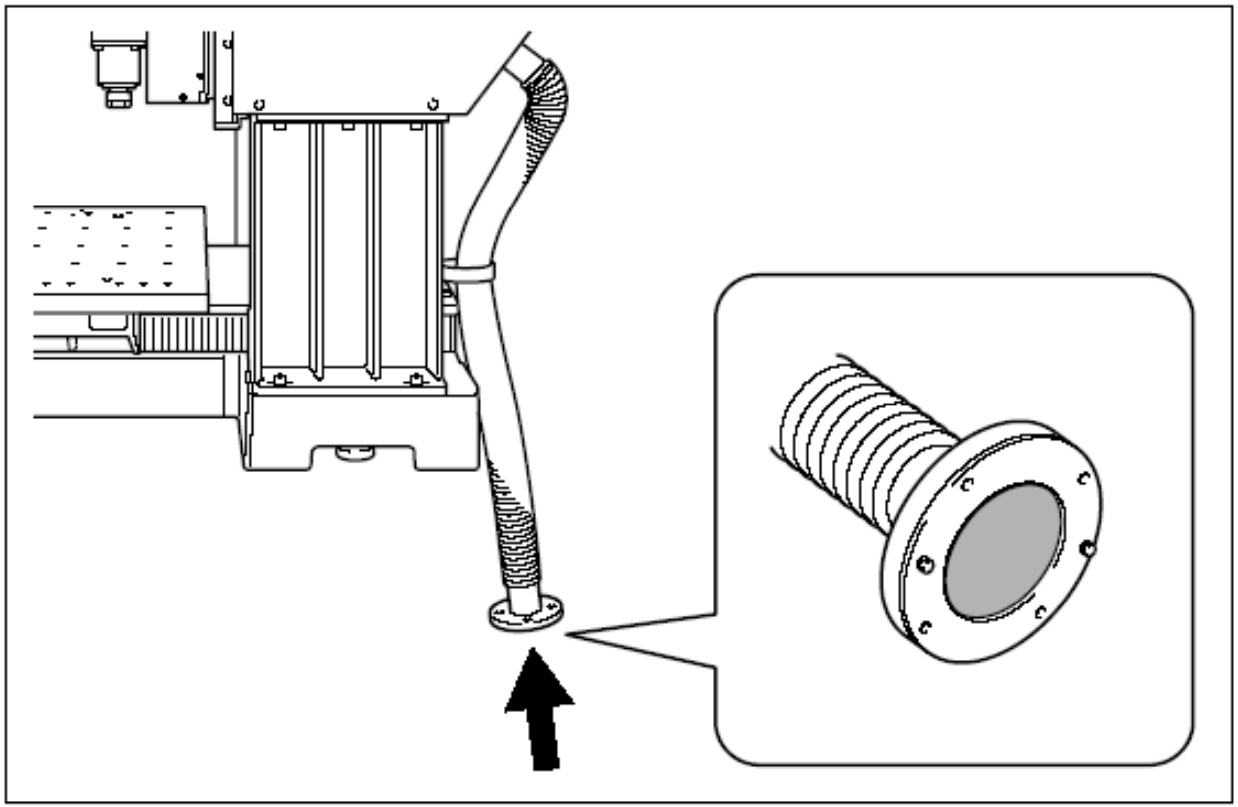
- Spindle & Collet



NOTES:

Maintenance

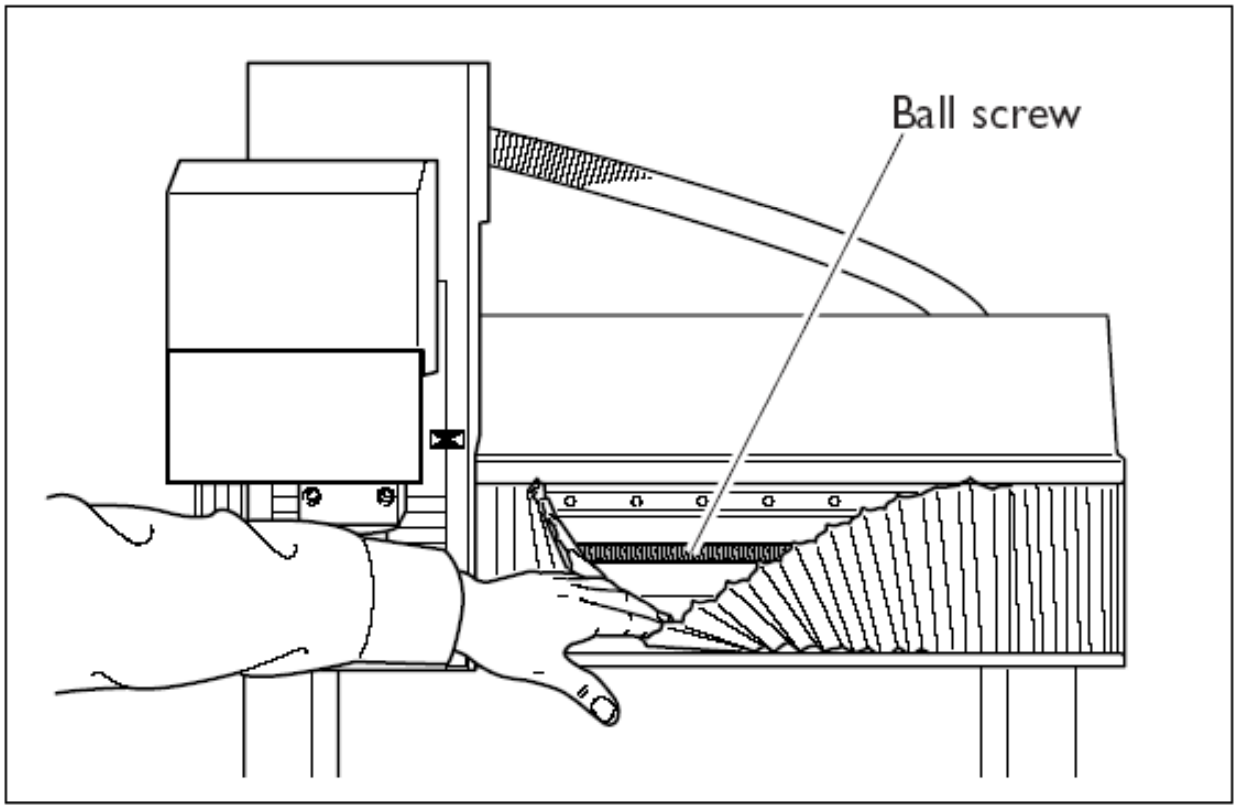
- Ventilation Duct Filter



NOTES:

Maintenance

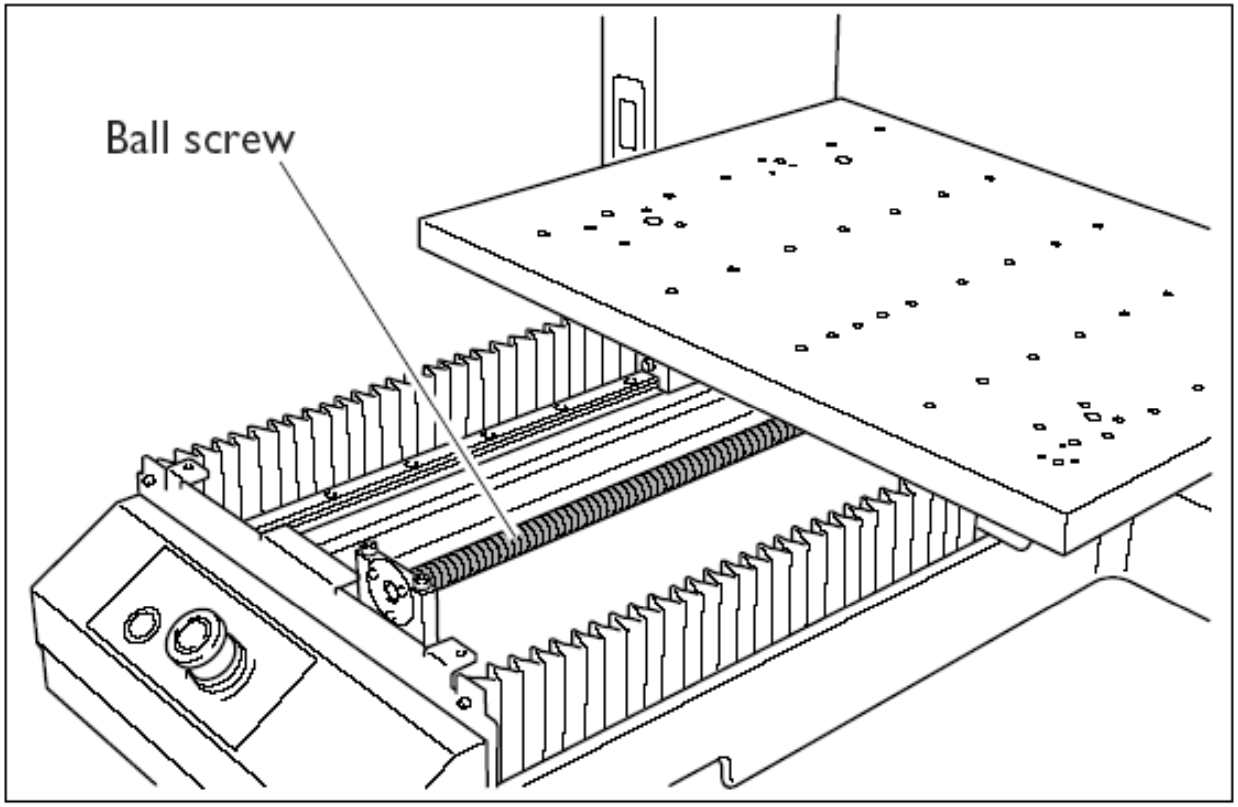
- Lubricating Ball Screws – X Axis



NOTES:

Maintenance

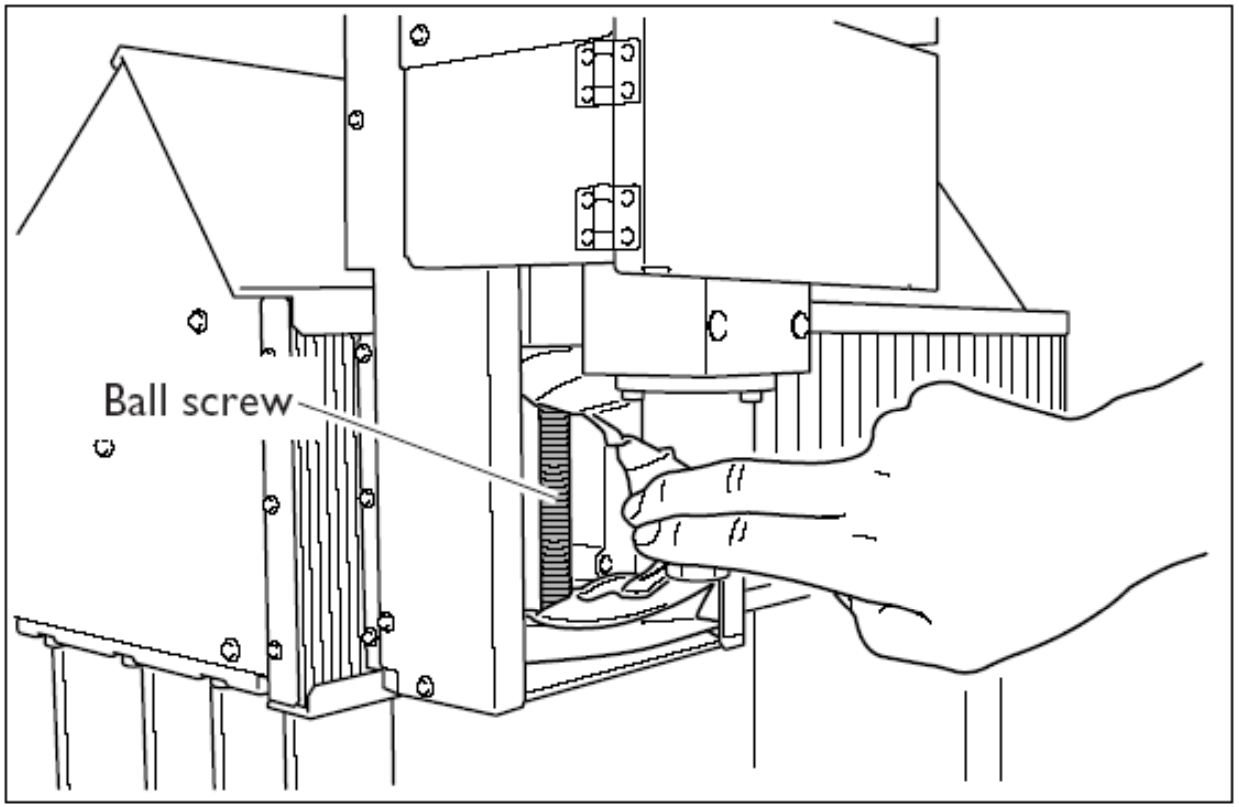
- Lubricating Ball Screws – Y Axis



NOTES:

Maintenance

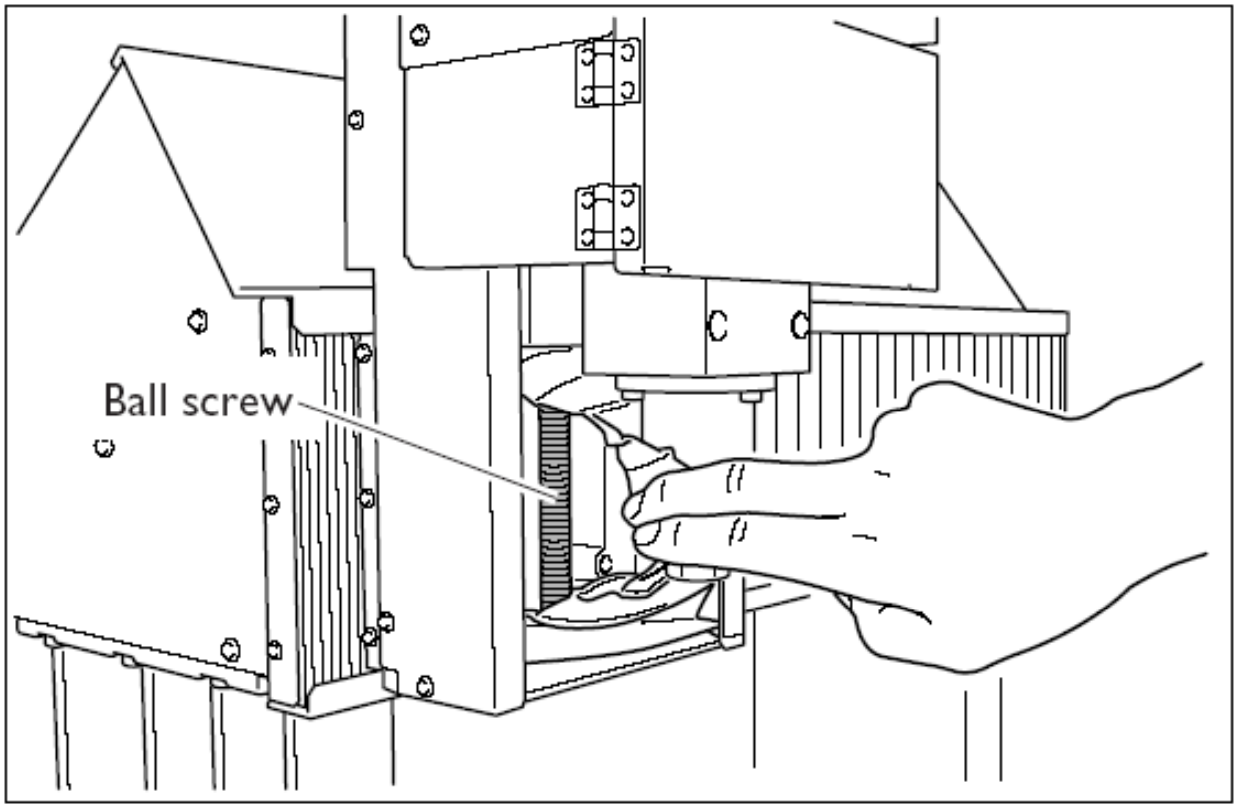
- Lubricating Ball Screws – X Axis



NOTES:

Maintenance

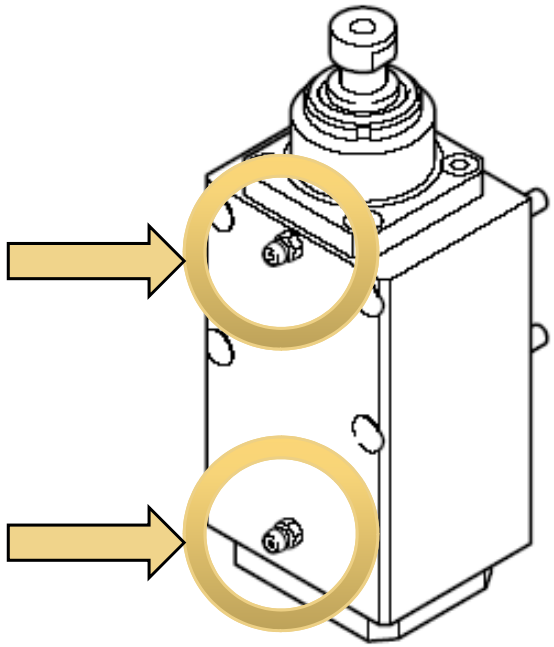
- Lubricating Ball Screws – X Axis



NOTES:

Maintenance

- Lubricating ATC Spindle (If equipped)

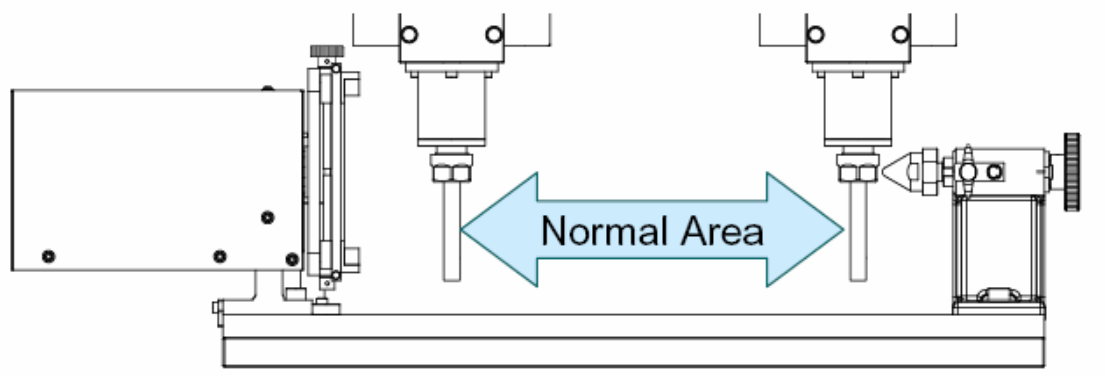


NOTES:

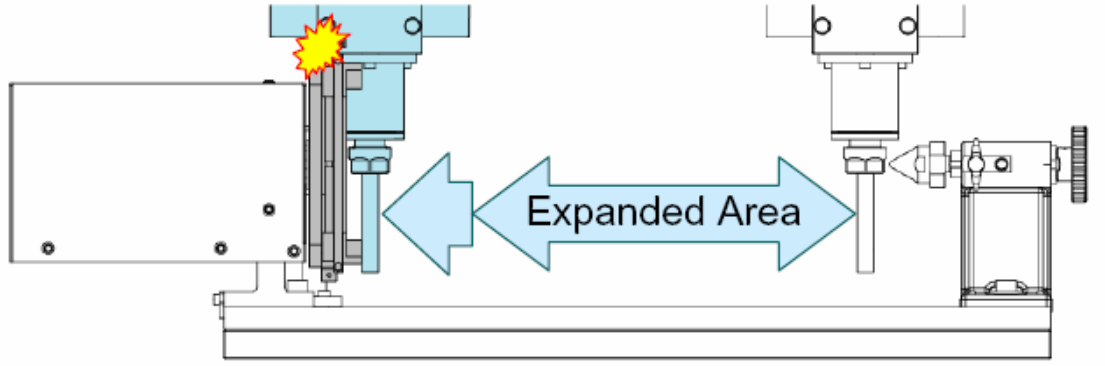
Roland®
Advanced Solutions Division

Support Bulletin: RASD-SB00041
Model: Roland MDX-540 series WITH ZCL-540 Rotary Axis Unit
Subject: Expansion of ZCL-540 Milling Area
Date: 10/14/2007
Author: PG

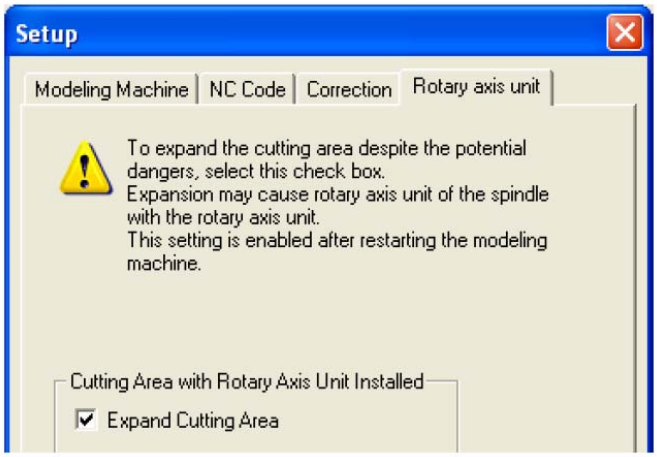
The standard milling area is meant to prevent the spindle or tool from colliding with the ZCL-540 Rotary Axis Unit.



The milling area can be expanded however this increases the risk of tool collisions.



To expand the milling area, open the Virtual Panel and click the set up button. Select Rotary axis unit tab and check the Expand Cutting Area option.



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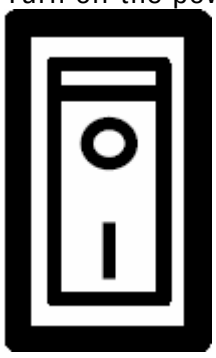
Support Bulletin: RASD-SB00041
Model: Roland MDX-540 series WITH ZCL-540 Rotary Axis Unit
Subject: Expansion of ZCL-540 Milling Area
Date: 10/14/2007
Author: PG

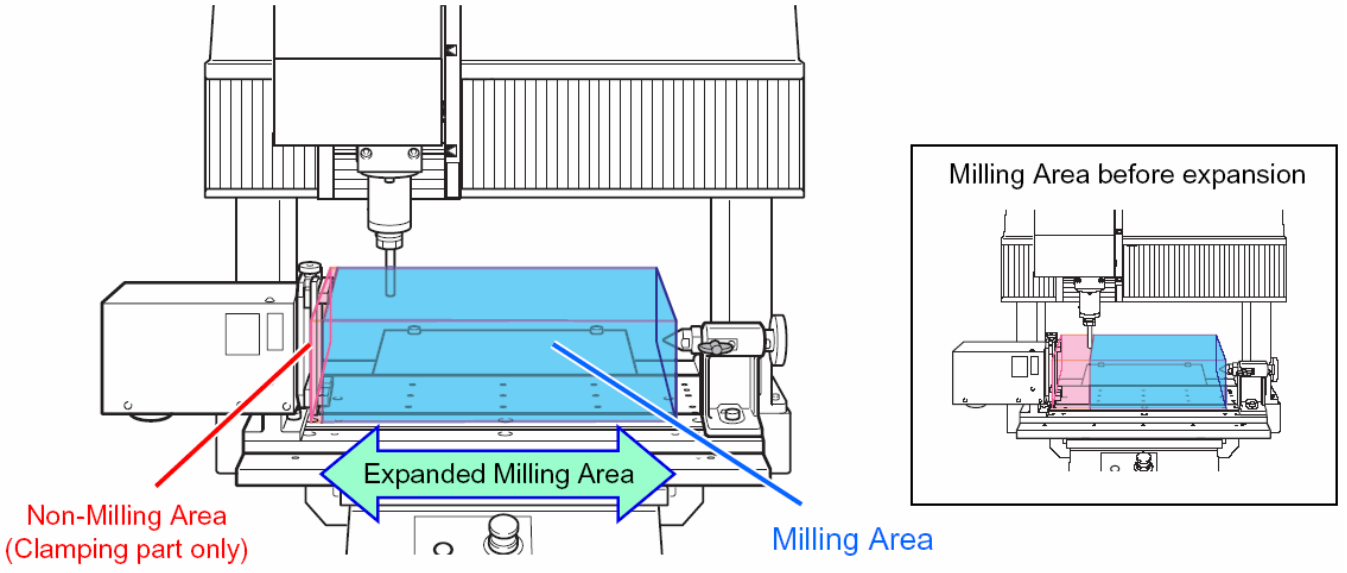
Turn off the power to the machine and restart the machine.



Notes:

*****The machines X-Origin may have to be reset after restarting the machine*****

*****Special care must be taken when selecting this option as there is a greater risk of collision*****



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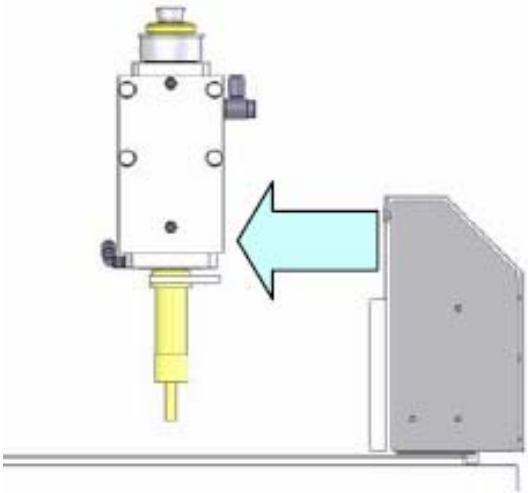
Support Bulletin: RASD-SB00042
Model: Roland MDX-540A/SA or ZAT-540 Automatic Tool Changer Unit
Subject: Tool Holder Stuck in Spindle
Date: 10/14/2007
Author: PG

How to remove Tool Holder Stuck in Spindle:

1. Turn off power and manually move the spindle to the left.



2. Turn on the power and press [CLEAR] button to do a force release and pull down on the tool holder.

3. Press the [CLEAR] button to do a force release and hit the root of the toll holder from its front with a plastic hammer lightly.

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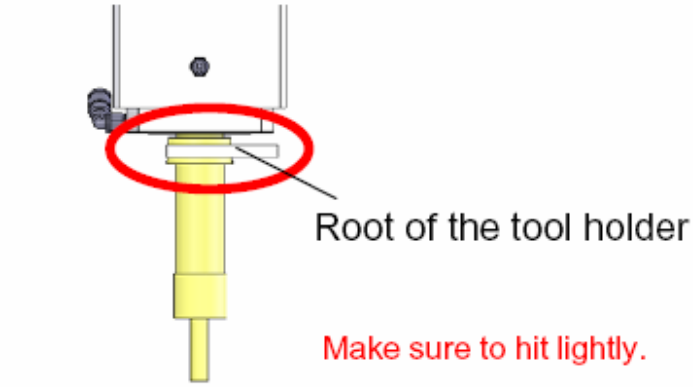
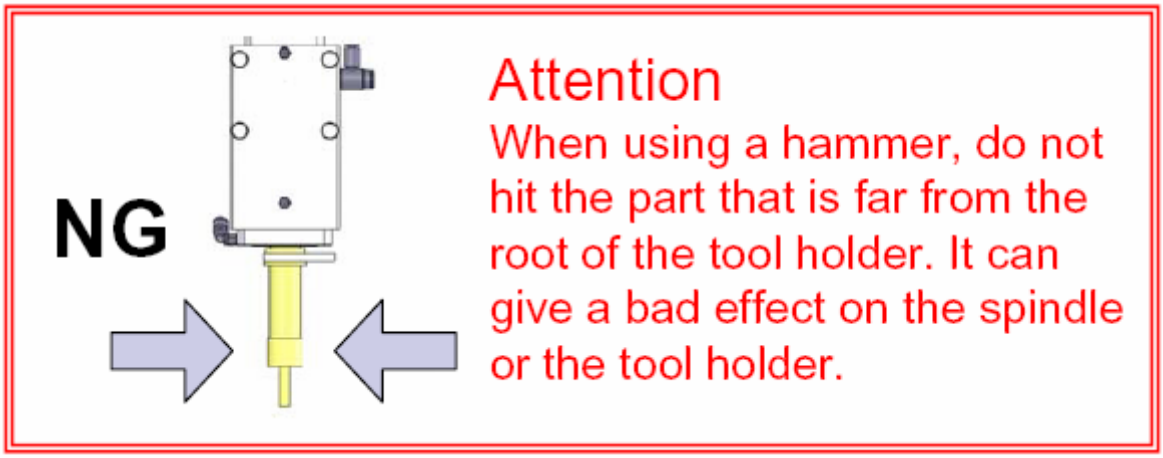
Support Bulletin: RASD-SB00042
Model: Roland MDX-540A/SA or ZAT-540 Automatic Tool Changer Unit
Subject: Tool Holder Stuck in Spindle
Date: 10/14/2007
Author: PG



4. If the tool holder can not be removed, remove the ATC spindle from machine, use a hand press machine (or something similar) to push in the top of the spindle which will release the tool holder.



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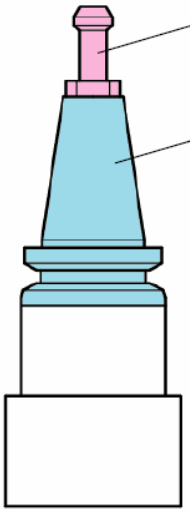
Roland®
Advanced Solutions Division

Support Bulletin: RASD-SB00042
Model: Roland MDX-540A/SA or ZAT-540 Automatic Tool Changer Unit
Subject: Tool Holder Stuck in Spindle
Date: 10/14/2007
Author: PG

Reasons for Tool Holder sticking in Spindle:

1. Tool Holder gets stuck due to rust or scratches on taper shank.
2. Metals stick together by oxide film generated by heat of long milling time or high spindle loads.



Attention
Never touch the pull-stud or taper shank with your hands. It will be the cause of rusting.

How to prevent Tool Holder sticking in Spindle (Tool Holder Maintenance):

1. The tool holder is originally supplied with antirust oil applied. The oil will evaporate after being removed from its original packaging. Remove holder from original packaging and remove antirust oil.

2. Apply silicone spray on the Tool Holder and wipe it clean.
3. As a daily maintenance, apply silicone spray to the tool holder and taper portion of the tool holder and wipe it clean.

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Roland®
Advanced Solutions Division

Support Bulletin: RASD-SB00042
Model: Roland MDX-540A/SA or ZAT-540 Automatic Tool Changer Unit
Subject: Tool Holder Stuck in Spindle
Date: 10/14/2007
Author: PG

Silicone Spray will provide the following benefits.

1. Keeps object dry prevents dust from accumulating on it.
2. Silicone oil film prevents rust and scratches.
3. Silicone oil film prevents oxide film from being generating from long milling time or high spindle loads.

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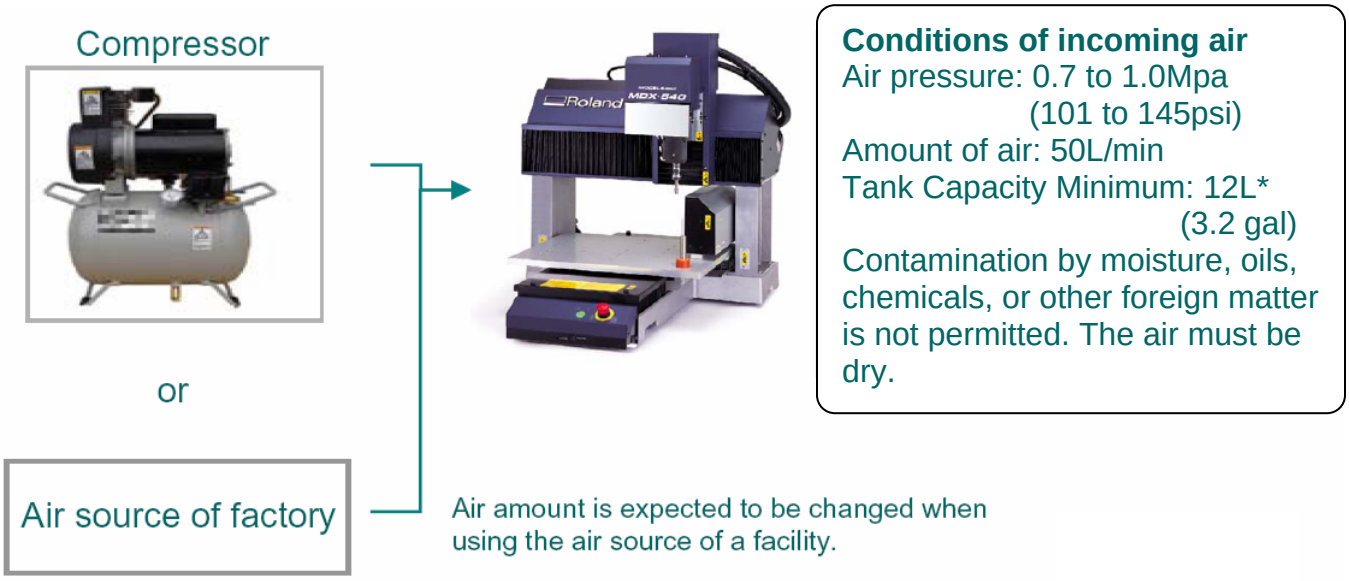
Roland®
Advanced Solutions Division

Support Bulletin: RASD-SB00043
Model: Roland MDX-540A/SA or ZAT-540 Automatic Tool Changer Unit
Subject: Compressed Air Requirements and Maintenance
Date: 10/14/2007
Author: PG

When using the MDX-540A/MDX-540SA or ZAT-540 Automatic Tool Changer, it is necessary to have compressed air supply to the machine with the following requirements.

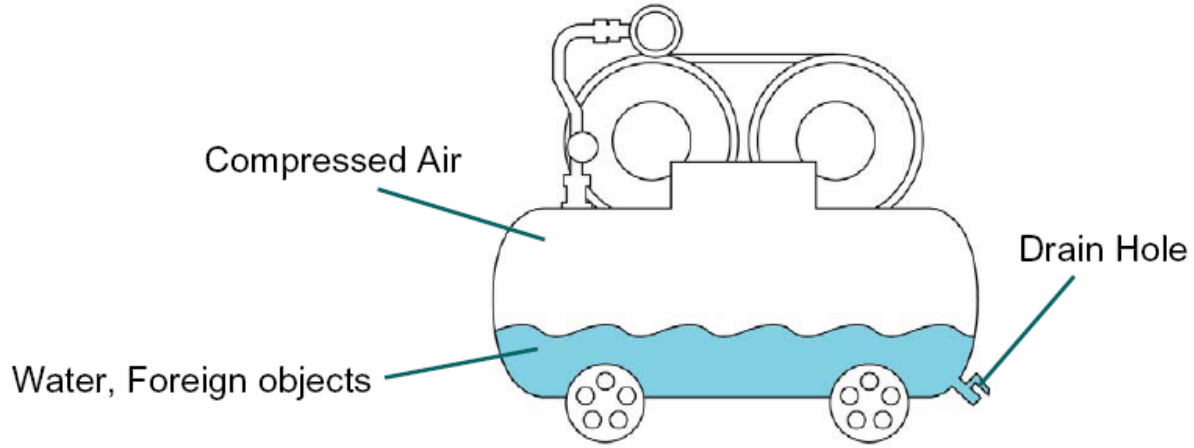


Conditions of incoming air
Air pressure: 0.7 to 1.0Mpa
(101 to 145psi)
Amount of air: 50L/min
Tank Capacity Minimum: 12L*
(3.2 gal)
Contamination by moisture, oils, chemicals, or other foreign matter is not permitted. The air must be dry.

*The compressor motor will operate more frequently when a smaller tank capacity is used.

Compressor Notes:

1. As you compress air, water is accumulated in the tank. Water and foreign objects such as rust must be drained occasionally.
2. If water is not drained occasionally, water may enter the ATC unit and affect its performance.
3. Using a dryer can not remove water completely.



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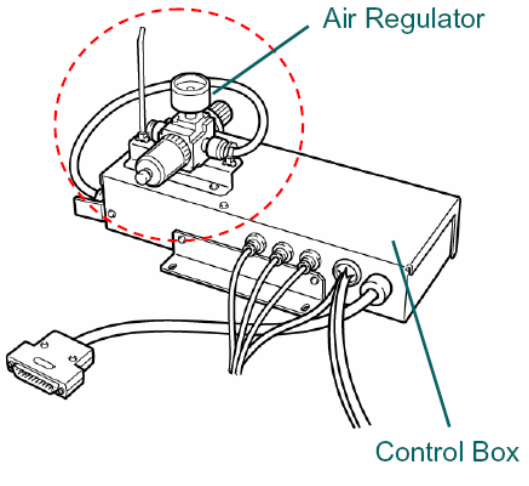
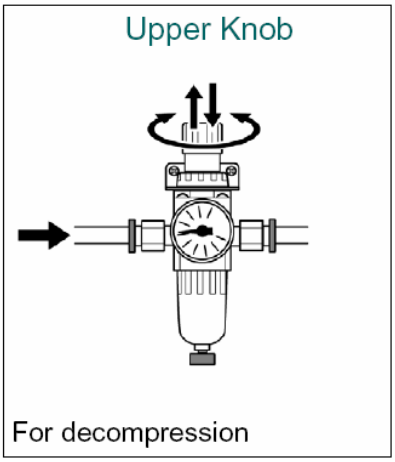
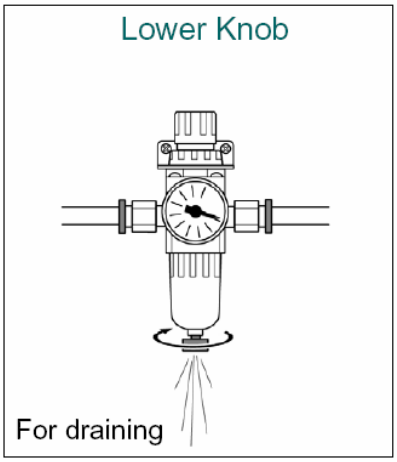
Support Bulletin: RASD-SB00043
Model: Roland MDX-540A/SA or ZAT-540 Automatic Tool Changer Unit
Subject: Compressed Air Requirements and Maintenance
Date: 10/14/2007
Author: PG

Air Regulator Notes:

1. Regulates the air supply to the machine to ensure it receives the proper pressure.







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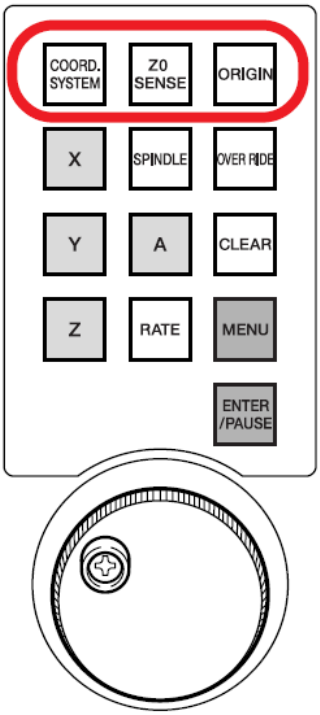
Support Bulletin: RASD-SB00045
Model: Roland MDX-540 w/ Automatic Tool Changer
Subject: Removing Tool Lodged in Material or Z-Sensor
Date: 10/26/2007
Author: PG

The following document demonstrates how to recover from a tool that is lodged in material or stuck on top of the Z Origin Sensor when equipped with the Automatic Tool Changer. If the machine enters an emergency stop condition and needs to be restarted, the tool will need to be released. If the tool is lodged in material or sitting on top of the Z-0 Sensor when it tries to release the tool, it will not function as the tool needs a little clearance to be safely removed from the ATC Spindle. Please follow the below instructions to recover.

1. Enter the machines service mode by pressing all top 3 keys on the Handy Panel as you turn the machine on.



2. Select Z-Brake Check and press Enter. Once the Z-Brake is released, the Z-Axis will be free to be moved by hand as the X&Y axis are normally when the power is turned off.

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Roland®
Advanced Solutions Division

Support Bulletin: RASD-SB00045
Model: Roland MDX-540 w/ Automatic Tool Changer
Subject: Removing Tool Lodged in Material or Z-Sensor
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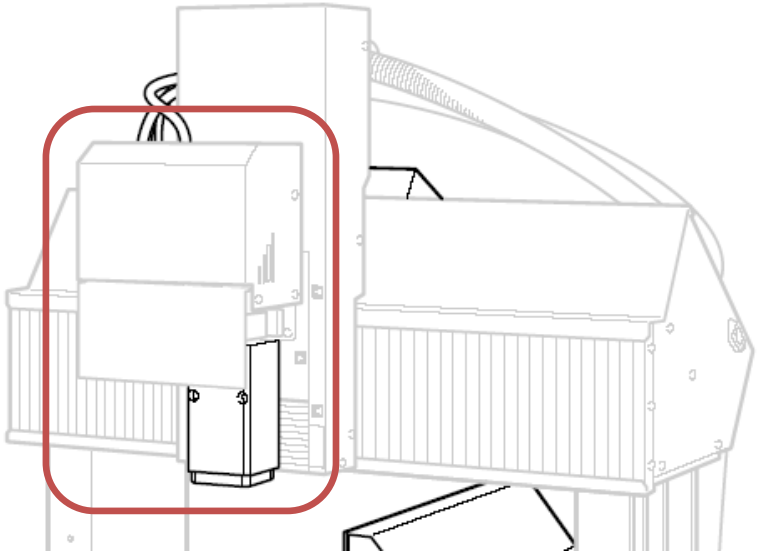
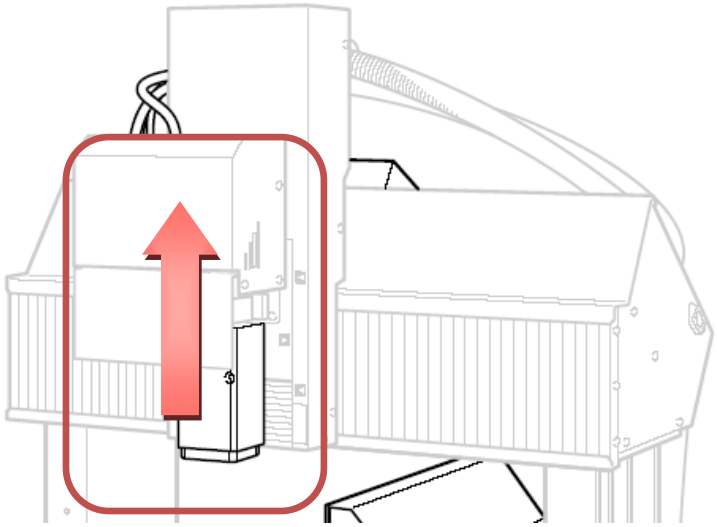
3. Support the Z-Axis Carriage either with a block of material or with hand.



4. Press the Enter button on the Handy Panel. The Z-Axis can now freely move up or down.

5. Move the Z-Axis up a couple of inches.



6. Press the Enter button to lock it in place.

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Advanced Solutions Division

Support Bulletin: RASD-SB00045
Model: Roland MDX-540 w/ Automatic Tool Changer
Subject: Removing Tool Lodged in Material or Z-Sensor
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7. Press the Clear button to exit Z-Brake Mode.

8. Restart the machine and follow the Handy Panel to remove the tool holder.

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MDX-540 Resources

Resources

- **Plastics**
  - Plastics supplier, various US locations
  - www.professionalplastics.com

- **Special Tooling**
  - Long reach tooling
  - EXOCARB series by OSG
  - www.mscdirect.com

- **Tooling Board**
  - Renshape tooling board
  - Vacuum form board, prototypes, models
  - www.freemansupply.com

NOTES:

Resources

- **Benches**
  - Sturdy benches for machines in various sizes
  - K-series heavy duty benches
  - Different countertops, wood, stainless, formica, etc.
  - www.benchdepot.com

- **Clamp Set**
  - TE-CO Metric Steel Super Clamp Kit (10mm)
  - Part number: 68101
  - www.te-co.com

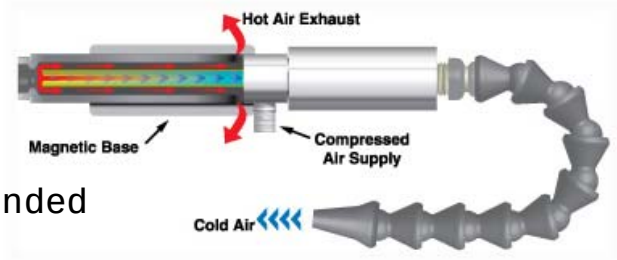
- **Vice**
  - Toolmakers vice
  - For example, Accupro JC-25-035
    5” Jaw opening, 3.5” width, 3.5” height
  - Available at www.mscdirect.com

NOTES:

Resources

- **Silent Compressors**
  - Provides quiet operation for office environments
  - As quiet as a refrigerator
  - 6+ gallon models recommended
  - More expensive than standard compressors
  - www.silentaire.com

- **Cold Air Gun**
  - Provides cold air to cutting area
  - Uses compressed air only
  - Large industrial compressor recommended
  - www.exair.com



NOTES:

Technical Support

Technical Support

- **Technical Support (Level 1)**
  - Your authorized Roland distributor is your first option for customer training and technical assistance.

- **Technical Support (Level 2)**
  - If your authorized Roland distributor is incapable of helping you with your technical issue, then contact Roland Technical Support.
  - Roland offers free email technical support for all products.
    - Email rxpress@rolanddga.com with questions.
    - To expedite help, include following information
      - Name
      - Company name
      - Roland model number and serial number
      - Phone and fax number
      - Roland software name and version
      - Error message
      - Brief description of issue

NOTES:

Technical Support

- Roland also offers free live technical support for products under factory or extended warranty.
  - Roland product must be registered before contacting Technical Support.
  - Please register at www.rolanddga.com
  - After product is registered, contact Roland Technical Support at 949-727-2100 or 800-542-2307
  - Please have following information ready
    - Name
    - Company name
    - Roland model number and serial number
    - Phone and fax number
    - Roland software name and version
    - Error message
    - Brief description of issue
- If you would like live technical support and your machine is out of warranty or extended warranty you can do so on a “Pay as You Go” per incident cost basis.

NOTES: